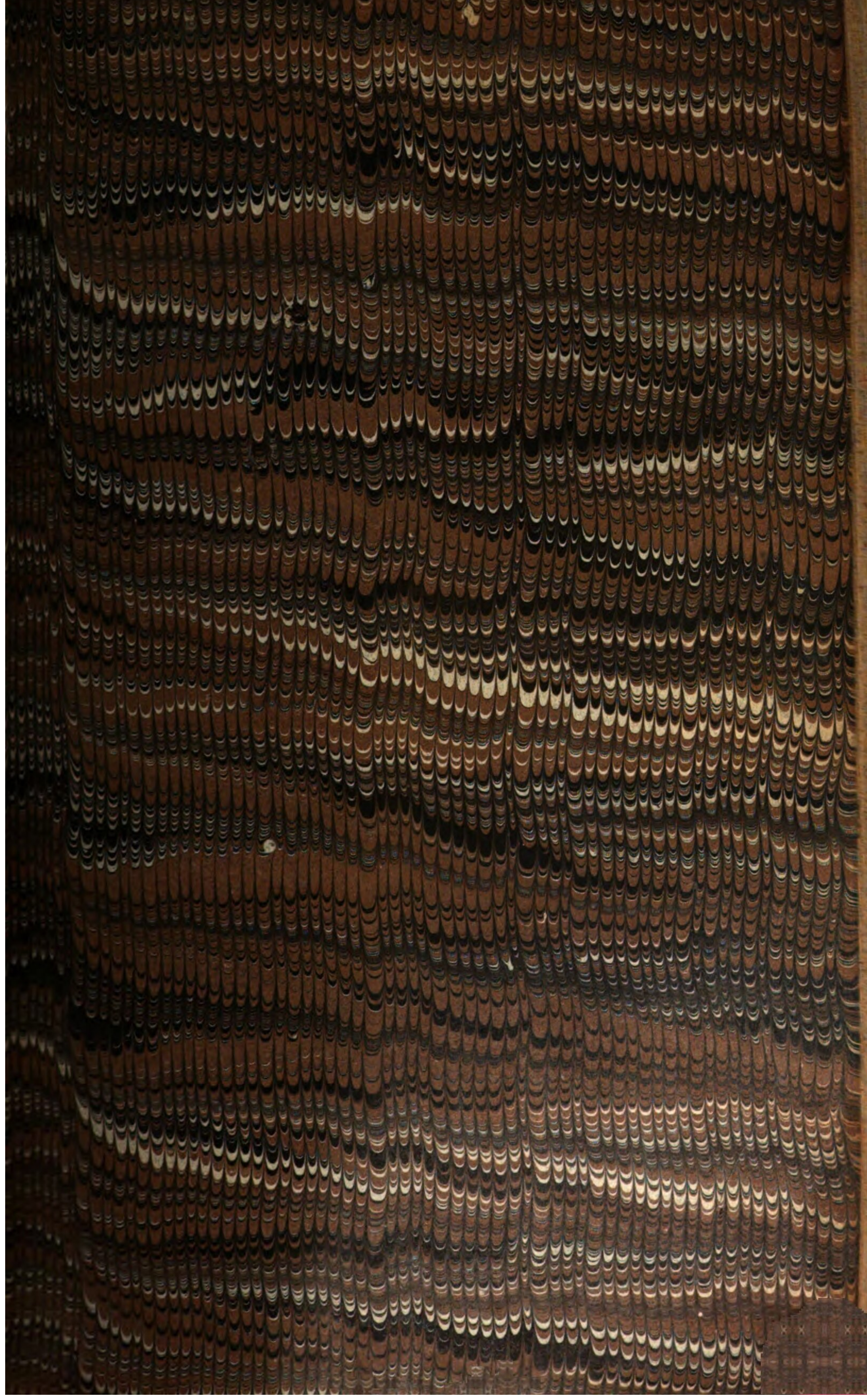






BOUND BY
E. BRADLEY,
BOSTON



Lool.
51⁵/₂

Binney

THE
TERRESTRIAL
AIR-BREATHING MOLLUSKS
OF
THE UNITED STATES, &c.

THE UNIVERSITY OF

THE UNIVERSITY OF

THE UNIVERSITY OF

THE
TERRESTRIAL
AIR-BREATHING MOLLUSKS
OF
THE UNITED STATES,
AND THE
ADJACENT TERRITORIES OF NORTH AMERICA:

DESCRIBED AND ILLUSTRATED BY

AMOS BINNEY.

EDITED BY
AUGUSTUS A. GOULD.

VOL. II.

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Fool. CANST TELL HOW AN OYSTER MAKES HIS SHELL?

Lear. No.

Fool. NOR I NEITHER; BUT I CAN TELL WHY A SNAIL HAS A HOUSE.

Lear. WHY?

Fool. WHY, TO PUT HIS HEAD IN.

Lear, I. 5.

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PNEUMOBANCHIATA.

FAMILY I.

LIMACIDÆ.

THE SLUGS.

CHARACTERS. Body elongated, sub-cylindrical, upper surface convex, lower surface flat, and consisting throughout its whole length of a muscular disk or plane, by the action of which the animal crawls. Back wholly or partially covered with a fleshy mantle or cuirass, oval in shape and differing in size and position in the different genera, but in all of them protecting the respiratory and circulatory organs. Integuments transparent, and without much consistence, containing numerous glands with intervening furrows; the glands secrete a copious watery mucus, and the furrows, anastomosing with each other, form a somewhat symmetrical network of channels, which convey the mucus to every part, and constantly lubricate the whole surface. Mouth anterior, the head provided with four

contractile and retractile cylindrical tentacles, gradually diminishing in diameter towards the end, and terminating in a bulbous expansion; the superior pair long, and bearing, in the terminal bulbs, organs supposed to be eyes; the inferior pair under the head, short and without eyes. Orifices of the organs of respiration, generation, and digestive excretion on the right side, but varying in position in the genera. Hermaphrodite, but requiring the union of two individuals for fecundation. Shell rudimentary or none. Herbivorous, or carnivorous, or both.

GEOGRAPHICAL DISTRIBUTION. This family is distributed through the temperate climes of the world, different genera and species being peculiar to different countries. Europe is the common centre from which they radiate into other parts of the old world, and from whence the species of that continent are destined to spread to every country which is reached by European commerce. Some of them have already gained a permanent footing in this country, though their range is yet limited. The native species have a general range, from the Great Lakes nearly as far south as the Gulf of Mexico, and from beyond the Mississippi to the sea-coast. One or more species have been already found on the western side of the continent. There cannot be a doubt that other species, not now known, will be discovered in the United States; for it would be most extraordinary if the vast area of this country should be found to be occupied by only two or three native species of the family.

HABITS AND PROPERTIES. The LIMACIDÆ are more especially nocturnal than the other families of the order, and they are so rarely visible in the day time that thousands may be near without being known. The injury which they commit in kitchen-gardens, for this reason, is often vaguely ascribed to worms or to birds ; and no measures are taken against the real culprits. Their habits, in general, coincide with those which have been described as distinguishing the order ; and we shall therefore mention here only those which are peculiar to them. They differ from the other families in not possessing the faculty of hibernation, or suspension of their organic functions during the cold season. In temperate latitudes, the *Helicidæ* hibernate, under all circumstances, on the approach of cold weather ; the *Limacidæ*, on the contrary, having the power of resisting extreme cold, continue in their usual haunts until severe frosts set in, when they retire into the earth and other sheltered retreats. Here they remain in a state of inaction and partial torpidity ; the functions of the body, however, still going on, though slowly and with diminished force. A slight increase of heat arouses them and stimulates their organs to renewed action, and they accordingly often come abroad in mild weather, even during the winter. Those which inhabit cellars and other protected situations, are in motion throughout the year ; and individuals of all the genera and species which we have kept in confinement have continued active, fed freely, and increased in size as much in the coldest months as in the summer.

All the species which have yet come under our notice possess the power of suspending themselves in the air by a gelatinous thread. This they effect by accumulating a quantity of tenacious mucus at the posterior extremity of the foot, which they attach to the object from which they are to commence their descent; then, loosing their own hold, they hang suspended by this point. Continuing the secretion, their own weight attenuates the mucous attachment, and draws it out into a thread. As this dries and hardens, a fresh supply is afforded, the thread is lengthened, and the animal lets itself down any desirable distance. At this time, also, the margin of the foot pours out mucus freely, and during the whole operation the locomotive disk is in active undulatory motion, in the same manner as when in ordinary progression. It appears in this way to guide and force towards the extremity the mucus which is secreted on its surface, and which, collected at its extreme point, forms the thread. The slug often pauses in its descent, and extends its tentacles and its whole body in various directions, as if seeking some object on which to make a lodgment. The faculty of suspending themselves in this manner indicates that they pass some part of their lives on trees, from which they can thus make a convenient descent to the earth; there are some species, indeed, which are stated to inhabit trees almost exclusively. It may serve also as a means by which they can suddenly escape from the attacks of their enemies, and particularly of birds. It is mostly, however, when they are young, or at least

not grown to their full size, that they enjoy this power. Those which have attained their extreme dimensions and weight are too heavy to trust themselves to so frail a support. They have no power to elevate themselves again, and in this respect are inferior to the spiders, which can both lower and raise themselves by the aid of the secreted thread. Like the spiders, however, they often remain suspended in mid-air for a time, and it is not unlikely that there is some pleasurable sensation connected with the act, which induces them thus to prolong it. We have seen the descent actually practised by every one of our Atlantic species.

Besides the watery fluid which at all times lubricates the integuments, the animals can, at their will, secrete at any point, or over the whole surface of their bodies, a more viscid and tenacious mucus than is usually exuded. This power is used as a means of defence. Whenever a foreign substance touches them, immediately a quantity of this mucus, of the consistence of milk and nearly of the same color, is poured out and forms a kind of membrane interposed between themselves and the irritating substance. So, also, when they are surrounded by a corrosive gas, or are thrown into water or alcohol, they form over themselves in this way a thick protecting covering, which is undoubtedly a non-conductor of heat and impervious, at least for a time, to liquids. Shielded by this coating, they can live the greater part of a day immersed in water, and for a shorter time in alcohol; and M. Férussac asserts that they have survived for hours in

boiling water. They leave a trace of their usual secretion on every object over which they pass, and thus can easily be tracked to their retreats. The ordinary secretion is most abundant at their posterior extremity. The secretion of the mucous fluid over their surface is necessary to their existence. Death immediately follows the failure of this power, and is preceded by the drying up of the skin.

All the species are extremely voracious, and devour an incredible quantity of food in a short time. Those found in this country are generally supposed to be vegetable feeders, but nearly all of them subsist occasionally upon dead animal matter of which they seem to be fond, and when in confinement sometimes attack and devour each other; and the foreign genus, *Testacella*, is known to prey habitually upon earth-worms. It is probable, therefore, that in their natural condition, all of them at times resort to animal food, and devour earth-worms, insects and their larvæ, and such other animals as, inhabiting the same retreats, are like themselves slow of motion and defenceless. It is certain, however, that the principal food of those species which frequent the neighborhood of houses and gardens, consists of the tender leaves of succulent plants and of ripe fruits. Upon these, in Europe, they perpetrate serious ravages, often destroying in a night the labors and hopes of the gardener, and in some years committing so much injury, and interfering to such a degree with the prosperity of the agriculturist that they are ranked among the

scourges of the country. Like caterpillars, locusts, and rats, they are considered to be perpetual enemies, and a war of extermination is carried on against them. To limit the extent of the evil, many remedies have been proposed, and among others the prayers and exorcisms of the church have been claimed, but without any considerable abatement of it. Happily, we are not in this country subject, in the same degree, to the mischief done by these animals, for their excessive increase is kept in check, probably, by the vicissitudes of the climate; but it may be useful to know that a border of ashes, sand, or sawdust, laid around the bed containing the plants it is desired to protect, will prove an impassable barrier to the slugs, so long as these substances remain dry. When the slugs attempt to pass the barrier, they become entangled in the dry ashes or sand, which envelops them entirely. The particles of these adhere to the viscid surface of the animals, who, in vain endeavoring to disengage themselves from them by secreting new mucus, at length become exhausted and die.

Their growth is remarkably rapid. We have known the young to double their size and weight in a week. The earliest hatched young of the season generally attain their full maturity before the end of the first year, although they may afterwards increase somewhat in bulk. Those which leave the egg at a later period, mature during the second year. Individuals kept in confinement and fully fed reach a much greater size than when in their natural condition.

They possess, in a remarkable degree, the power of elongation and contraction of the body. When fully extended it is long, narrow, more or less cylindrical, and generally terminating in a sharp point. The carina of the carinated species disappears. The head is protruded far beyond the mouth; the tentacles are long, slender, and graceful. The mouth is changed from an oval to an elongated form, with parallel sides and rounded ends. The glands are lengthened, lose their prominence, and appear nearly smooth. But when alarmed by the touch of a foreign substance, an instant change occurs, and a sudden contraction takes place. The tentacles are retracted and the head is drawn under the mantle. The anterior edge of the mantle is brought to the level of the foot, and its form becomes nearly circular. The body is shortened to one-fourth of its former length, and tumid; the back is rounded and rises high in the centre, and the skin is rough with prominent glandular protuberances. The carina, when it exists, becomes conspicuous. This is the form which they assume in their retreats when they retire to protect themselves from the effects of drought and cold. It differs so much from their form when in motion, that one not well acquainted with them would hardly recognize the same animal in its new shape. It is among the *Limaces*, perhaps, that the change is most striking, and the difference of form between the extremes the greatest.

They commence reproducing their kind as early as the end of the first year, before they have attained their full

dimensions, and hence the eggs of the same species often vary considerably in size. These are deposited in a cluster of thirty, or thereabouts, in the soil and in other moist and protected situations; or if the species be one that frequents houses, then in the crevices or corners of the walls or under the decaying planks of cellars. In general form and appearance they resemble the eggs of the *Helicidæ*, but differ from them in several important particulars. The eggs of the *Helicidæ* are all opake, while those of this family are more or less transparent, permitting, in the *Limaces*, a view of the cicatricula, and affording an opportunity of observing its developments. Those of the former family are all deposited free, or unconnected except by a slight agglutination; those of the latter, in some of the species, are connected together by a prolongation of the outer membrane at their longest diameter, thus forming a sort of rosary. The deposits of eggs when made, are abandoned by the slug, who then removes to some other convenient place. A considerable number of separate deposits are made during the year.

The slugs, and some species of snails were considered by the Romans to possess medicinal properties, and this belief continued, among the nations of Europe, through the middle ages down to comparatively recent times. There is hardly a disease, internal or external, of man or the domestic animals, in which, according to the statements of authors, they have not proved beneficial; and the relations concerning them are numerous and truly mar-

vellous. The testaceous rudiment of the *Limax* acquired in this respect a preëminence above the animal itself, and enjoyed a high rank among the numerous bezoars and amulets which were supposed to protect the body from evil influences, and to impart health and activity to its various functions.* The accounts of their virtues, copied from one author to another, on the authority of names, show how easily error is perpetuated, and how difficult it is to eradicate from the public mind a false opinion which has once obtained a footing. A full relation of all the absurdities which gained credence, would form a curious page in the history of credulity and superstition. The more general diffusion of knowledge at the present day has dispelled these ideas in a great degree; but some relics of them still linger among the rural population of many parts of Europe. In this country, no such belief has ever prevailed; and so hidden and clandestine are the habits of the animals, that but a small part of the population is aware of their existence, and those who are familiar with them view them with such feelings of disgust as would effectually prevent their use either as medicine or as food. They have also from very early times been used in the preparation of cosmetics; and the water procured from them by distillation, no longer than two or three centuries ago, was much celebrated and used by ladies, to impart whiteness and freshness to the complexion.

* As late as the close of the sixteenth century, Helling published a dissertation with this title: "*Ossiculorum limacum usus in febris.*"

REMARKS. The type of the family, as the term implies is the genus *Limax* consisting of animals known by the name of *slugs*. They are found throughout the greater part of Europe and North America, and also in many other parts of the world ; indeed, the more common species are almost universally diffused throughout the temperate latitudes, and are undoubtedly destined to spread over every country which is accessible to European or North American commercial enterprise. The family corresponds with the *Limaciens* of M. Lamarck, and includes all the air-breathing land-mollusks not furnished with a spiral shell in which the internal organs, arranged in convolutions, are lodged. It is a very natural division, and although the species at one extreme of the family are entirely naked, and destitute of even the rudiments of a shell, internal or external, at the other, they approach to the *Helicidæ*, and exhibit a near affinity to some of the genera of that family. The terminating link is the genus *Testacella*, which is wanting in this country. The dividing line is however obvious. *Testacella* does not possess a truly spiral shell, while *Vitrina*, which is the connecting genus of the next family, is provided with a fleshy mantle, and with a well defined spiral shell, in which a portion at least of the internal organs are placed, thus uniting in itself some of the characters of both families. There is no difference among authors, therefore, as to the limits of the family ; but the genera are not so well established, and cannot be, until their animals are better known. Some of those proposed by M. Férussac will be

found to want essential distinctions sufficient to constitute genera. Confining our attention to such of them as have representatives in this country, we find that *Arion* is not universally received, and that its diagnostic characters are by some thought to be of little importance. We shall not enter into this question, but shall only remark, that unless the whole family is reduced to a single genus, as it stood in the time of Linnæus, it will, in consequence of the general similarity of their organization, be necessary to found the genera upon slight differences of structure. Considerable difference exists between the structure of *Limax* and *Arion*; besides which, as the former has become numerous in species, it is desirable, as a matter of convenience, to subdivide it. We have therefore adopted the latter genus.

Very little attention has hitherto been given, in the United States, to the animals of this family. The only paper on the subject which we have met with, excepting that published by ourselves, in the Journal of the Boston Society of Natural History, is one by the late M. Rafinesque, contained in one of his abortive periodicals entitled "*Annals of Nature*" for 1820. In this paper that author, with his usual facility in proposing new genera and species, gives the characters of two genera and six species, from animals noticed by him in various parts of the country, but not since recognized by other naturalists. We have discussed the character of M. Rafinesque in the preface, and have given the reasons why we cannot adopt his proposed genera; we have also

copied there his generic and specific characteristics. We refer those who consider his pretended discoveries of more weight than we do, to that part of this work. M. Férussac gave his sanction to the genera of M. Rafinesque by adopting them in his great work ; but they were by nearly every other naturalist received with much doubt, and considered to require further confirmation.

In examining the species which was first noticed by M. Bosc under the name of *Limax caroliniensis*, we became aware that, instead of being destitute of a mantle, as might be inferred from his description, that organ was more fully developed than in any described species, and covered the whole body. As this characteristic excludes it from *Limax*, according to the received definitions, it became necessary to establish a new genus for its reception, which we proposed in January, 1842, under the name of *Tebennophorus*. The distinction thus founded on its external characters, has been confirmed by an acquaintance with its anatomical peculiarities, since ascertained by Dr. J. Wyman. In August, 1842, a genus which he called *Incillaria*,* was proposed by Mr. W. H. Benson, in a Memoir on the fauna and flora of Chusan, by Dr. Cantor, in the Annals and Magazine of Natural

* The following are the generic characters as given in the Memoir :
"Corpus elongatum, posticè attenuatum, repens, undique velo marginatum. Tentacula quatuor, superioribus oculiferis, inferioribus integris. Foramen commune in latere dextro, non procul ab extremitate anticâ veli situm." The name is derived from "incile," a gutter, and has reference to the gutter-like channel which divides the mantle from the foot.

History, Vol. IX. p. 486, to include an animal resembling the type of *Tebennophorus*, and so far as we can judge by the description, corresponding with it generically. Whether either of these genera will be received, is uncertain, and will depend of course upon the opinion of other naturalists, after the animals shall be fully known. If neither of them should be adopted, the characters of *Limax* will need an entire revision and enlargement.

The following formula shows the generic strength of the family in this country.

LIMACIDÆ.	{	VAGINULUS,
		TEBENNOPHORUS,
		ARION,
		LIMAX.

These are the only genera hitherto discovered. Of these *Vaginulus* is a tropical genus, and barely touches the most southern point of the United States, rendering it probable that it was introduced from the West Indies. *Tebennophorus*, before the publication of Dr. Cantor's Memoir, was supposed to be peculiar to the United States and Canada. It must now be at least doubtful whether it is exclusively an American genus. *Arion* is certainly an imported genus, owing its introduction to our commercial relations with Western Europe. *Limax* is also an introduced genus, so far as regards two out of three of its known species, and perhaps as to the third. We have then, not even one genus which is unquestionably indigenous to our territory.

GENUS VAGINULUS, FÉRUSAC.

GENERIC CHARACTERS.

ANIMAL. Body oblong oval when contracted, more or less linear when extended; mantle covering the whole body: foot narrow, wrinkled transversely as if composed of numerous rings; head distinct, and capable of being retracted under the mantle; buccal mass with a jaw and with papillæ arranged around the mouth; tentacles four, unequal, contractile, but not fully retractile, the upper ones long and slender, annulated, obtuse and oculiferous at tip, the lower ones short and more or less branched at tip. Pulmonary cavity on the right side, at about two-fifths the length of the animal, and opening, by means of a tube running along the side, at the posterior extremity, between the mantle and the free point of the foot, in company with the anal opening. Organs of generation separate and distant, the male organ protruding at the base of the right tentacle; the female opening about the middle of the right side. Mucous pore none.

SHELL. None.

GEOGRAPHICAL DISTRIBUTION. Has been found at a single locality, namely, at Charlotte Harbor on the west coast of Florida. It is a tropical genus, inhabiting the West Indies, and according to D'Orbigny, nearly every part of South America as far as 34° south, on the east of the Andes, though its range is not so great on the Pacific coast. It is also found in other tropical regions.

REMARKS. This genus was instituted by Férussac in 1821, but had been previously designated by Blainville under the name of *Veronicella*, who subsequently, however, merged them both in the genus *Onchidium* of Buchanan. There can be no doubt of the propriety of separating the terrestrial species from the marine species, all of which were combined in the original genus *Onchidium*, to whichever group we may assign that name.* Their habits, form, tentacles, and their anatomical details are all different.

The contractility of the animal is very great. When extended it is very long and slender, and smooth or faintly reticulated, three or four times as long as when contracted; in which latter state it has an oblong form, equally rounded at both ends, and its surface is coarsely wrinkled, granular or tuberculated. The lower tentacles are generally bifurcate at tip, or rather there is a supplementary tentacle or spur, which can be protruded just short of the point of the tentacle; sometimes the tips are said to be even palmate.

It lives in families under stones and trunks of trees, and sometimes buried in the earth. It is capable of retiring from damp places, and sometimes inhabits very dry localities. It issues forth in the night and on wet days, when it may be found upon trees. Its movements are very rapid.

* I employ in this instance the name selected by Dr. Binney, though both the names of Blainville and Buchanan have priority. — G.

VAGINULUS FLORIDANUS.

PLATE LXVII.

V. corpore elongato-ovali, lateribus vix arcuatis, extremitatibus semicircularibus, dorso rotundato, quoquoversum arcuato, subtiliter rugoso, cinereo, fusco-marmorato, lineâ medianâ albâ et fasciis lateralibus imperfectis fuscis ornato; subtus luteo-albido, disco transversim plicato, trientem latitudinis componente; tentaculis inferioribus incertè bifurcatis.

DESCRIPTION.

Animal (contracted in alcohol) elongated oval, about four times as long as broad, the sides very slightly curved, and the extremities circularly rounded; back convex, regularly arched in every direction; surface very slightly wrinkled; color dark ashy gray, mottled with black, with a median whitish line, on each side of which, at about one-third the distance towards the margin, is an ill-defined stripe of black; beneath drab colored; foot occupying about one-third the width; tentacles short, annulated, the lower ones not very distinctly bifurcate. Length two and one-fourth inches; breadth three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found at Metaleechee Key, Charlotte Harbor, on the western coast of Florida, in a moist place, a little under ground.

REMARKS. The above description is obviously very imperfect, inasmuch as it is described from a dead and greatly contracted specimen, and as no notes of the ani-

mal have been found excepting as to its locality. The characters, however, are sufficiently marked to distinguish the species. From its slight reticulation, in its contracted state, it must have been quite smooth when extended. Its colors are similar to those of *Tebennophorus Caroliniensis*, and similarly distributed. The lower tentacles are not very conspicuously spurred, but the puncture for the protrusion of a spur is manifest.

As the anatomical details have been fully given in the first part, this animal, the only one of the genus yet found in the United States, will not be without interest.

GENUS *TEBENNOPHORUS*, BINNEY.

GENERIC CHARACTERS.

ANIMAL. Body somewhat flattened, terminating obtusely, or in a somewhat truncated form. Back convex, more flat when fully extended. Integuments with irregular vermiform glands, anastomosing with each other, and having a general longitudinal direction. Mantle covering the whole body. Locomotive disk expanded at its margin, and visible beyond the sides of the mantle; no median band. Respiratory orifice near the head. Anal orifice contiguous to, and a little above and in advance of, the pulmonary orifice. Orifice of organs of generation behind and below the superior tentacle. Without terminal mucous pore. No shell.

GEOGRAPHICAL DISTRIBUTION. This genus occurs in every part of the country from the Gulf of Mexico to Lake Erie, except the tertiary section of the extreme south, where it has not yet been noticed.

REMARKS. The species on which this genus is founded is *Limax Caroliniensis* of Bosc. M. Férussac included it in Rafinesque's genus *Philomycus*, which is distinguished from *Limax* by the absence of the mantle. Having adopted Rafinesque's genus with all its characters, he nevertheless, by a singular inconsistency or oversight, arranged it under that division of the family containing the species entirely covered with a mantle. It thus found a position more in accordance with its real characters than it would have done, if the generic definition of M. Rafinesque or the description of M. Bosc had been kept in mind. The editors of the new edition of M. Lamarck's work have again, more recently, described it as destitute of a mantle, but in truth it possesses a well characterized mantle, detached from the body at its anterior part, and around its whole margin. M. Férussac, supposing the other genera included in the same division to possess only contractile tentacles, by a convenient method of generalization, inferred, that this species also was destitute of the power of retracting these organs; we know very well, however, that they are retracted by inversion, in the same manner as those of the *Limaces* and *Helicidæ*. He speculated also upon the uses of the development of the structure of the

mantle, which he thought might the better enable the animal to resist the heat of warm climates; it must, however, in this genus at least, be intended for some other purpose, for it is a northern rather than a southern genus, inhabiting the most northern parts of the United States, where the winters are long and severe. It is also, by its habits, very much removed from the influence of heat. An opinion the reverse of that of M. Férussac, namely, that it is an additional protection from cold, seems to be more probable.

1. **TEBENNOPHORUS CAROLINIENSIS, Bosc.**

PLATE LXIII. FIGURES 1, 2.

T. corpore albido, fusco irrorato, fasciis tribus male-circumscriptis longitudinalibus, et punctis nigris sparsis, ornato, clypeo lato et elongato dorsum totum vestiente, glandulis undulatis, confertis, instructo; aperturâ communi anticâ.

SYNONYMS AND REFERENCES.

Limax Caroliniensis, Bosc, loc. cit. p. 80.

FÉRUSSAC, Hist. p. 77, pl. 6, fig. 3.

DESHAYES, in Lamarck, 2d edit. VI. p. 719.

Limax Carolinianus, DE ROISSY, loc. cit. V. p. 183.

Limax togata, GOULD, Inverteb. of Mass. p. 3.

Philomycus Caroliniensis, FÉRUSSAC, Tab. Syst. p. 15.

Tebennophorus Caroliniensis, BINNEY, Limacidæ, p. 11.

ADAMS, Shells of Vermont, p. 13.

DESCRIPTION.

Color of upper surface whitish, or yellowish white, variegated with clouds and spots of brownish and blackish, so arranged as to form three ill-defined longitudinal

bands, one on the centre of the back, and one on each flank, extending from the head to the posterior extremity, anastomosing more or less with each other, and having smaller spots of the same color between them; inferior margin white, or yellowish; foot whitish. Mouth surrounded with a circular row of papillæ. Body elongated, sub-cylindrical, flattened towards its posterior extremity, which is obtuse; superior tentacles one-fourth of an inch long, brownish or blackish, stout, terminating in a bulb; ocular points on the superior part of the bulb; inferior tentacles immediately below the upper, white, very short, nearly conical. Mantle fleshy, covering the whole body, its anterior edge tinged with brownish, and falling in a slight curve between the two superior tentacles, reaching on the sides to the margin of the foot; posterior extremity rounded; cuticle covered with irregular vermiform glands, anastomosing with each other, and having a general tendency to a longitudinal direction, with shallow furrows between, lubricated with a watery mucus, and susceptible of contractions which produce a slow, undulatory motion, like the flowing of water, over the whole surface. Foot whitish, extending a little beyond the mantle posteriorly, showing a whitish flattened border. Orifice of the organs of generation on the right side, at a little distance behind and below the superior tentacle. Respiratory orifice large, on the right side, one-fourth of an inch behind the origin of the superior tentacle; anal orifice in close contact, a little above and in front of it; above the respiratory orifice, on the back, is a deep

curved furrow, running upwards and backwards. Locomotive band not distinguished from the lower surface of the foot.

Greatest length, when fully extended, four inches; ordinary length three inches.

GEOGRAPHICAL DISTRIBUTION. Noticed by the original discoverer in South Carolina; is common in Vermont, the western part of Massachusetts, New York, and Ohio, and was found in Missouri by Professor C. B. Adams, and by Mr. Haldeman in the south-western angle of Virginia.

REMARKS. In this species the head never projects beyond the mantle. The tentacles are contractile and retractile, as in the other slugs. When handled it secretes from the skin a thick, milky, adhesive mucus. Small individuals suspend themselves by a thread. We have noticed its posterior extremity curved upwards when the animal was in motion; at other times flattened and expanded, and again very much corrugated, and apparently truncated; sometimes there *appear* to be one or more mucous glands at this part, and the secretion of mucus from it is more plentiful than from other parts of the body. The mantle is not cleft from the respiratory foramen to the margin, as in most of the Limacidæ, but is provided with a deep furrow or canal running from the orifice to the edge of the mantle below it.

It is very inactive and sluggish in its motions. It inhabits forests, under the bark, and in the interior of

the decayed trunks of fallen trees, among which it is particularly partial to the Bass-wood, *Tilia Americana*.

The variations from the common coloring are numerous. We have already observed the following varieties :

- a.* Whitish, without clouded spots, tending to grayish.
- b.* Whitish, slightly clouded longitudinally.
- c.* Irregularly clouded with brownish, without any tendency to longitudinal arrangement.
- d.* With three distinct rows of large clouded spots.
- e.* With great numbers of fine black spots.
- f.* Gray, with a line of minute black dots along each side.
- g.* Blackish-gray, with black lines along each side, and an indistinct line down the middle of the back.

The appearance of the surface of the mantle is constantly changing, from the play of light on its lubricated tentacles and furrows, which are in almost ceaseless motion.

There can be no doubt that this is the animal originally described by M. Bosc under the name of *Limax Caroliniensis*, though his description is so imperfect that it can only be recognized by the arrangement of colors which belongs to it. His original drawing, engraved in M. Férussac's work, is a tolerably accurate representation of one of its varieties. He makes no mention of the mantle, and it does not appear in the figure.

An individual of this species kept in confinement, deposited about thirty eggs, June 20, 1843 ; on the 10th July the young made their way out of the shell. The

eggs were semi-transparent, oval, about one-fifth of an inch in the greatest diameter. The young when excluded were more than a fourth of an inch long, semi-transparent and gelatinous; tentacles bluish-black at base, black at tip, the inferior pair very minute and hardly visible. Body broad; back whitish, with two distinct rows of minute black dots down the middle, and other scattering spots on the sides. No perceptible furrow between the mantle and body. They increased very rapidly in size, and in a few days were four times as large as when hatched.

2. **TEBENNOPHORUS DORSALIS**, BINNEY.

PLATE LXIII. FIGURE 3.

T. corpore cylindraceo, posticè attenuato; dorso lineâ longitudinali nigrescente interruptâ et glandulis minutis elongatis instructo; aperturâ laterali parvâ, anticâ.

SYNONYMS AND REFERENCES.

Philomycus dorsalis, BINNEY, Limacidæ, p. 14.

ADAMS, Shells of Vermont.

DESCRIPTION.

Color of upper surface ashy, with a shade of blue, an interrupted black line extending down the centre of the back; superior tentacles black, about one-eighth of the length of the body; lower tentacles blackish, very short. Body cylindrical and narrow, terminating posteriorly in an acute point; base of foot white, very narrow, its separation from the body not well defined. Upper sur-

face covered with elongated and slightly prominent glandular projections, the furrows between indistinct. Respiratory orifice very minute, situated on the right side, about one-eighth of an inch behind the insertion of the superior tentacle. The mantle is closely connected with the body.

Length three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Noticed hitherto only in Vermont and Massachusetts.

REMARKS. This animal is found in woods and forests, in the soil under decaying trunks and logs. It is lubricated by a watery mucus which is not secreted in quantity sufficient to preserve its life when removed from its native haunts and exposed to the air. It is even difficult to preserve it long enough for examination, as it becomes dry, diminishes in bulk more than one-half, and dies. We have seen but three specimens. They were very active in their movements, and one of them suspended itself by a thread of mucus, in the manner of the *Limaces*. Our specimens were found in Vermont. Dr. Gould has recognized this or a similar species near Boston.

It is quite possible that this is one of the species described by Rafinesque, but from the poverty of his descriptions, we are unable to identify it with either of them.

When we for the first time procured this animal, not being able to distinguish the separation of the margin of the mantle from the edge of the foot, we felt assured that it must be a species of M. Rafinesque's genus *Philo-*

mycus, and we accordingly described it as such. Having an opportunity since that time of examining several of them, we noticed, on throwing some of them into alcohol for preservation, that the contraction, caused by the liquor, revealed and detached the mantle from its adhesion. Its characters, therefore, correspond with those of the present genus. It is by no means certain, however, that it may not prove to be the young of the preceding species.

GENUS ARION. FÉRUSSAC.

GENERIC CHARACTERS. Posterior termination of body obtuse. Integuments crowded with elongated tuberosities on the back, and on the sides with elongated tubercular plates having furrows between. Mantle anterior, oval, small, covered with granulations, free at the front and on the sides, attached posteriorly, containing in its posterior part numerous fine calcareous sandy grains. Locomotive disk not expanded at the margin, when the animal is fully extended very narrow, having in some species a narrow median band, and in others not. Respiratory orifice at the anterior margin of the mantle, small. Anal orifice contiguous to the former. Orifice of organs of generation under the two last. On the upper part of the posterior extremity of the body is a triangular pore or sinus, with the point directed forwards, a process or projection of the integument serving as a cover to the sinus.

GEOGRAPHICAL DISTRIBUTION. Has been noticed hitherto only in gardens in the city of Boston, and at road-sides in its vicinity.

REMARKS. The genus *Arion* was separated from *Limax* by M. Férussac, to contain those species of the latter genus having a terminal pore or sinus. Besides this distinction, the mantle of the *Arion* contains no rudimentary shell, a few calcareous grains being deposited in its place; the respiratory foramen also is situated at the anterior in place of the posterior margin of the mantle. These differences, with their anatomical peculiarities, seemed to him to furnish sufficient reason for the separation. His example has been generally followed, though there are some who, like M. Deshayes, deny the propriety or expediency of the change.

1. ARION HORTENSIS, FÉRUSSAC.

PLATE LXIV. FIGURE 1. PLATE LXV. FIGURE 2.

A. corpore albido, aut griseo, aut rufescente, glandulis confertis elongatis striato; clypeo ovali, granuloso; caudâ obtusâ, absque carinâ; aperturâ communi anticâ; margine fasciâ fuscâ obscure ornato.

SYNONYMS AND REFERENCES.

Arion hortensis. FÉR. Hist. p. 65, pl. 2, f. 6. Sup. p. 96, a.
 LAMARCK, 2d edit. p. 719.
 BOUCHARD-CHANTEREAUX, loc. cit. p. 24.
 BINNEY, Limacidæ, p. 10.

DESCRIPTION.

Color, whitish, or light ashy, sometimes with a tint of

brown, or dark grayish ; an obscure, ill defined dark colored line or band rises where the mantle meets the base of the tentacles on both sides, and extending along the whole length of the mantle to its posterior extremity converges towards the line of the opposite side ; another band proceeding from under the posterior edge of the mantle, not quite continuous with the above described line, runs along the sides of the body to its extremity. Body, cylindrical, narrow, when extended very much elongated, expanding a little towards its extremity, and ending in a flat and rounded termination ; its upper surface is covered with narrow, oblong, prominent glands, appearing sometimes as if carinated, and arranged in parallel rows, the flanks with elongated tuberculated plates and finer granulations. Head darker than the body, projecting very little beyond the mantle. Superior tentacles blackish, one-eighth the length of the body, stout, bulbs translucent, ocular spot at the superior part, black. Lower tentacles immediately under the upper, very short, conical. Mantle small, oval, narrow, commencing just behind the insertion of the tentacles, less than one-third of the length of the animal ; covered with granulations tending to a vermiform shape.

Disk of the foot whitish, without a separate locomotive band, the marginal boundary between it and the body marked by a furrow, projecting beyond the body posteriorly. Respiratory foramen small, with a cleft to the margin of the mantle. Between the superior tentacles is a tubercular ridge with furrows on each side. The triangular mucus-pore is on the upper surface of the

posterior extremity, is very apparent, and has a process of the skin which seems to cover it, and sometimes to project above it. When fully grown, the extreme length is more than two inches, its usual length about one inch.

REMARKS. When the animal is fully extended, the mantle occupies less than a fourth part of its whole length, and the dark lines on the mantle and back are continuous with each other. The head only, projects from the mantle, the neck not being visible. Its surface is constantly covered with a watery mucus, and it suspends itself with a thread of mucus like the other species. The mucous secretion from the terminal pore is transparent and very viscid. It is not distinguished by any considerable variety of color or markings. It occurs in small numbers in the vicinity of Boston, under stones, at road-sides, in company with *Limax agrestis*, and more plentifully in gardens within the city. In our remarks on this species, formerly published, we hesitated in considering it to be identical with the foreign species of the same name. Having since found it somewhat numerous in a locality in the city, we have procured specimens agreeing very well with foreign descriptions and figures, especially with that variety described by M. Férussac as "griseus, unicolor, fasciis nigris," and have no longer any doubt on the subject. The specimens found in gardens are however, much larger than the size indicated by the descriptions. It is called a small species by both M. Férussac and M. Lamarck, and so it is, as it exists in the

country ; but in the city it is sometimes two inches in length, when not fully extended, and of a corresponding bulk. The dark lines are most strongly marked in the large variety. The small variety is more delicate in its markings, and has a tinge of yellow on the foot. It is still restricted in its distribution, so far as observed, to a limited range in the neighborhood of Boston alone, and its numbers do not appear to be large. There can be no doubt, we think, of its being an introduced species.

ARION FOLIOLATUS, GOULD.

PLATE, LXVI. FIGURE, 2.

A. corpore depresso, fulvo, sulcis nigricantibus obliquè reticulato, areolis inclusis foliosis ; clypeo prælongo, lævi, fulvo, concentricè fusco notato ; aperturâ communi ante-mediani ; tentaculis parvis, brevibus.

SYNONYMS AND REFERENCES.

Arion foliolatus, GOULD, MS., Mollusca of the U. S. Exploring Expedition.

Color a reddish fawn, coarsely and obliquely reticulated with slate-colored lines forming areolæ, which are indented at the sides, when viewed by a magnifier, so as to resemble leaflets ; the cuirass is concentrically mottled with slate color, and the projecting border of the foot is also obliquely lineated. The body is rather depressed, nearly uniform throughout, and somewhat truncated at the tip, exhibiting a conspicuous pit, which was probably occupied by a mucous gland. The shield is very long, smooth, and has the respiratory orifice very small, situa-

ted a little in front of the middle. The tentacles are small and short. Length, three and one-half inches.

REMARKS. That this animal belongs to the genus *Arion* there can be little doubt, from the peculiar structure of the tail, as represented in Mr. Drayton's figure, and from the anterior position of the respiratory orifice. It is a well-marked species, characterized especially by the little leaf-like areolæ by which the surface is marked. It was found by Dr. Charles Pickering near Discovery Harbor, Puget Sound.

GENUS LIMAX, FÉRUSAC.

GENERIC CHARACTERS. Body lessening towards the posterior extremity, which terminates in a point. Back with a carina or keel when contracted, convex when extended. Integuments with longitudinal elongated glands, and anastomosing furrows arranged in the same manner upon both sides. Mantle anterior, oval, marked with fine concentric striæ, unattached and free at the front and sides, but connected with the body at its posterior part, and containing in this part a testaceous rudiment or shell. Locomotive disk not expanded at margin, having a narrow band running longitudinally along its centre and separated from the sides by a well-defined line or furrow. Respiratory orifice near the posterior margin of the mantle, large. Anal orifice im-

mediately adjacent to, but a little above and anterior to the respiratory orifice, with a cleft or fissure through the mantle from the orifice to its edge. Orifice of organs of generation near, and immediately behind, the superior tentacle. Testaceous rudiment, thin, concentric, not spiral, covered above with a thin and transparent periostraca, below smooth.

GEOGRAPHICAL DISTRIBUTION. Inhabits all parts of the United States except, perhaps, the tertiary section of the Gulf of Mexico, in which it has not yet been noticed. There is every reason to believe that some of the species will be found in that section also, although not so numerous as in the more temperate climate further north. The favorite locality of the genus is in the milder parts of the temperate zone, where it flourishes in great numbers. Individuals become less numerous on approaching the equator, and also in going to the extreme north. One or more undescribed species are known to occupy the western coast of North America, in the Oregon territory.

REMARKS. The animals of this genus appear to possess the power of accustoming themselves to changes of climate and condition in a greater degree than any others of the order; hence they accompany man in his voyages, and are found wherever he makes a permanent settlement. Some of the European species are probably found in every country, and almost upon every island which has been colonized by Europeans; and in the mari-

time parts of the United States they are extremely abundant. Like rats and mice, and various destructive insects which have proceeded from continent to continent and from island to island in the same manner, they occupy the houses and other structures, and the immediate vicinity of man, preying upon the fruits of his industry, and consuming his stores of provisions. Like them they thrive only in the vicinity of, and, as it were, in contact with man, and never withdraw from him to resume their original manner of living in the wilds. These habits are the cause of much mischief, and when the animals are numerous, render them the pests of the house and the garden. Their increase therefore, beyond a certain point, becomes prejudicial, and means are adopted to keep them in check. In various ways thousands of them are destroyed during the year, but their extraordinary fertility enables them to make the loss good, and to sustain themselves in undiminished numbers.

Dr. Dekay, in his Catalogue of the Animals of New York, has indicated *by name*, two new species of Limax, *L. lineatus* and *L. marmoratus*. But as they are not subsequently mentioned in his final report, it is probable that he regards them as varieties of some of the other described species.

M. Rafinesque also described a supposed species as *Limax gracilis*; its characters have been given in the introduction.

1. LIMAX VARIEGATUS, DRAPARNAUD.

PLATE LXV. FIGURE 1.

L. corpore lutescente, maculis albidis insignito; dorso glandulis elevatis angustis instructo; clypeo ovali, lineis circularibus concentricis et maculatis ornato; tentaculis cæruleis; carinâ brevi.

SYNONYMS AND REFERENCES.

Limax variegatus, DRAPARNAUD, loc. cit. p. 127, No. 9.

DE ROISSY, loc. cit. V. p. 182.

FÉRUSAC, Hist. p. 71, pl. 5, fig. 1-6. Sup. p. 96, e.

LAMARCK, loc. cit. 2d edit. VII. p. 722.

GRAY, loc. cit. p. 114.

Limax flavus, BINNEY, Limacidæ, p. 4.

DESCRIPTION.

Color brownish, yellowish brown, or ashy brown, with oblong-oval uncolored spots, which have a longitudinal disposition; mantle with rounded spots; head, neck, and superior tentacles blue, semi-transparent; lower tentacles white; base of foot sallow white. Body when extended cylindrical, elongated, terminating acutely with a short but prominent keel; upper part covered with long and narrow prominent tubercles. Mantle ample, oval, rounded at both ends, with numerous very fine concentric striæ. Sides paler, and without spots. Respiratory foramen large, placed near the posterior lateral margin of the mantle and cleft to the edge. Generative orifice indicated by a white spot a little behind the upper tentacle of the right side.

Length, when fully extended, usually about three

inches; an individual kept in confinement with abundance of food attained the length of nearly five inches, and several others that of four inches.

GEOGRAPHICAL DISTRIBUTION. Noticed hitherto in Massachusetts at Boston and Cambridge; in the cities of New York, Philadelphia, and Baltimore; in Virginia at Richmond, and at the University of Virginia.

REMARKS. The contrast of colors, and the elegant arrangement of the spots and lines, render this a beautiful species. The tubercles of the surface are very fine, and so much compressed as to appear in some lights to be carinated. There is often a well defined row of spots down the back. The upper tentacles are long and delicate, the mantle sometimes terminates posteriorly in an obtuse point, and the locomotive band of the foot is narrow and well defined. There is a prominent ridge on the head and neck between the tentacles, and a furrow marks the edges of the foot. It is active in its motions, turns rapidly, and often bends the body so as to form two parallel lines. It does not secrete mucus so freely as *Limax agrestis*. The carina is often yellowish. The testaceous rudiment is oblong-oval, convex above and concave below, thin and membranaceous in young individuals, with the superior surface smooth and covered with a delicate periostracum, and with the lower surface uneven. No spiral arrangement is visible to the eye, and it appears to be only a thin testaceous plate, imbedded in the mantle. In old individuals it attains a greater thickness.

It inhabits cellars and gardens in moist situations, in the cities. It is considered noxious to vegetation. It feeds upon the leaves of plants in kitchen gardens, and upon the remains of the cooked vegetables, and bread, thrown out from houses. Its most common habitat is in cellars, where it makes its presence most disagreeable by attacking articles of food, and especially by insinuating itself into vessels containing meal and flour. It is common, but not so numerous as *Limax agrestis*. The young suspend themselves by a thread of mucus.

This species is of foreign origin, but the period of its introduction is not known. It was noticed by Mr. Say, more than twenty years since. It is probable that it inhabits all the cities of the sea-coast, and their vicinage, but it has not been noticed in the interior, except at the University of Virginia, at Charlottesville.

2. LIMAX AGRESTIS, MÜLLER.

PLATE LXIV. FIGURE 2.

L. corpore albo, griseo, cinereo, rufescente aut nigrescente, unicolore aut maculato, sub-cylindraco, glandulis elongatis et sulcis fuscis reticulatis instructo; clypeo anteriori, ovali, gibboso, lineis concentricis striato; carinâ brevi; aperturâ laterali posticâ.

SYNONYMS AND REFERENCES.

Limax agrestis, MÜLLER, loc. cit. 2d part, p. 8, No. 204.

LINNÆUS, Syst. Nat. 2d edit. p. 1082.

DRAPARNAUD, loc. cit. p. 126, pl. 9, fig. 9.

FÉRUSAC, Hist. p. 73, pl. 5, fig. 7-10. Sup. 96.

LAMARCK, loc. cit. 2d edit. VII. p. 717.

BOUCHARD-CHANTEREAUX, loc. cit. p. 30.

BINNEY, Limacidæ, p. 6.

Limax tunicata, GOULD, Report, p. 3.

DESCRIPTION.

Color varying from whitish through every shade of cinereous and gray to black, and through various shades of yellowish, or amber-color, to brownish, and sometimes irregularly spotted with small black points or dots; tentacles darker than the general surface, sometimes black; mantle sometimes mottled with a lighter color; base of foot sallow white; sheath of tentacle indicated by black lines extending backwards from their base under the edge of the mantle. Body when in motion cylindrical, elongated, terminating acutely, the sides towards its posterior extremity compressed upwards, so as to form a short carina or keel; foot very narrow. Mantle oblong-oval, fleshy, convex and prominent, rounded at both extremities, equalling in length one-third of the length of the body, its surface marked by prominent, irregularly waved, concentric lines and furrows, having their centre on the posterior part, and its edges free throughout the whole circumference. Upper surface of the body marked with longitudinal lines, or shallow furrows, darker than the general surface, sometimes black, anastomosing with each other, and forming a sort of net-work; between the reticulated lines are narrow, irregular oblong plates, or smooth, flattened tubercles, giving the surface the appearance of a mosaic work, with lines of dark cement; reticulations less distinct on the sides, and disappearing towards the base; a prominent tubercular ridge extends from between the superior tentacles backward to the

mantle, with a furrow on each side. Superior tentacle cylindrical, about one-eighth of the length of the body, with small, black, ocular points on the superior part of the terminal bulb; inferior tentacles immediately under the upper, very short. Respiratory foramen near the posterior lateral edge of the mantle, large, surrounded with a whitish border. Orifice of rectum immediately adjacent, but a little above and anterior to the respiratory foramen. Foot narrow; locomotive band bounded by two distinct longitudinal furrows. Generally about one inch in length, but when fully grown nearly two inches.

GEOGRAPHICAL DISTRIBUTION. Inhabits the neighborhood of Boston, New York, Philadelphia, and other maritime cities. It will probably be found diffused pretty generally along the whole sea-board, but has not yet penetrated far into the interior of the country. We have not noticed it at a greater distance than one hundred miles from the coast.

REMARKS. It is undoubtedly of European origin. It is common in the neighborhood of Boston, under stones at road-sides, and about stables and farm-yards, and in other moist situations, under wet and decaying pieces of wood. It is also found in cellars and gardens, and causes some mischief by its depredations. A considerable number of individuals often congregate in the same retreat. Their food appears to be the green leaves of succulent plants, and sometimes ripe fruits; they feed during the night, and are rarely found out of their re-

treats in the day time. Their growth is rapid, the animal excluded from the egg in the spring arriving at full maturity and producing eggs before the succeeding winter. They defend themselves from injurious contact by instantly secreting, at the part touched, a quantity of milky-white, glutinous mucus. They are active in their motions, and soon escape when disturbed. Suspending themselves, head downwards, they lower themselves from plants and fences by forming a mucous thread which they attach to the point from which they hang. They are occasionally seen in this situation in rainy weather. During the process of excreting the mucous thread, the alternate undulating expansions and contractions of the locomotive band of the foot are seen to take place, in the same manner as when they are in motion on a plane surface.

This species is much more prolific than the others, the number of eggs deposited during the year being sometimes several hundreds ; its numbers, in favorable localities, are therefore very great. It begins to lay its eggs early in the spring, and continues, with intervals, until checked by the cold of approaching winter. The last deposit of them often remains in the soil until the succeeding spring, when they are hatched with the first generation of the year. The eggs are semi-transparent, and nearly globular. They produce young in about twenty days after they have been deposited.

M. Bouchard-Chantereaux has observed them to deposit eggs in sixty-six days after their own birth, and to attain their full size in eighty-two days.

This species varies very much in color, and the descriptions by different authors being drawn principally from it, differ greatly from each other; but whatever may be the color, the peculiar character of the furrows and tubercles remains constant. In a state of contraction, the back is arched, the head is entirely withdrawn under the mantle, the glands of the skin are very prominent, making the surface appear rough, the carina is more apparent, and the posterior extremity, being a little turned to one side, appears to be oblique. It is described by some authors as constantly oblique, but the obliquity disappears when the animal is fully extended. When in motion, the head extends considerably beyond the mantle, and there is an interval between its margin, and the base of the superior tentacle, equal to the length of the tentacles. The mantle adheres to the body by its posterior central portion, and it is in this part of it that is found imbedded the testaceous rudiment, or shell. This is oval, curved above, very thin and delicate, having a transparent epidermis. At its posterior part there is a slight apical prominence, and the appearance of indistinct concentric lines of growth.

There is no considerable variation in the species except in regard to color, which varies almost infinitely.

3. LIMAX CAMPESTRIS, BINNEY.

PLATE LXIV. FIGURE 3.

L. corpore cylindraceo, glandulis elevatis, elongatis subrugoso, colore succineo; clypeo ovali-oblongo, lineis et sulcis concentricis striato; caudâ sub-carinatâ.

SYNONYMS AND REFERENCES.

Limax campestris, BINNEY, Limacidæ, p. 9.

ADAMS, Shells of Vermont, p. 13.

DESCRIPTION.

Color usually of various shades of amber, without spots or markings, sometimes blackish; head and tentacles smoky. Body cylindrical, elongated, terminating in a very short carina at its posterior extremity. Mantle oval, fleshy, but little prominent, with fine concentric lines. Back covered with prominent elongated tubercles and furrows. Foot narrow, whitish. Respiratory foramen on the posterior dextral margin of the mantle. Body covered with a thin, watery mucus.

Length, about one inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the New England, Middle, and Western States, and is probably widely diffused through the country.

REMARKS. The resemblances between some of the species of this genus are so great that it is difficult to provide them with distinctive characters, and it is only

by close comparison that their differences can be seen. The present species, although considerably smaller, is nearly allied to *Limax agrestis*.

Its differential characters are as follows: It is always much smaller, and at all ages possesses a peculiarly gelatinous or semitransparent consistency. The tuberosities of the surface are more prominent in proportion to their size, are not flattened or plate-like, and are not separated by darker colored anastomosing lines, the intervening furrows being of the same color as the general surface. It does not secrete a milky mucus at every part of the surface when touched. Like that species, it is active in its motions, and suspends itself by a thread of mucus.

This species appears to be common to all the northern parts of the United States. It is found under decaying wood in the forests and in open pastures, and under stones at road-sides. From its wide distribution, it would seem to be indigenous.

Its testaceous rudiment is minute and delicate in proportion to the small size of the animal.

We give this as a species with some hesitation. Its near resemblance to *Limax agrestis*, in every respect except size and difference of habitat, induces us to doubt whether it is any thing more than that species living in its natural condition. On the other hand, the permanence of these differences, and the minor variations of surface which are more apparent in the dead animal preserved in alcohol, seem to entitle it to the rank of a species.

LIMAX COLUMBIANUS, GOULD.

PLATE LXVI. FIGURE 1.

L. corpulentus, corpore elongato, posticè carinato, sordide flavo, unicolore vel maculis atropurpureis nubeculato, tuberculis elongatis longitudinaliter dispositis tessellato; clypeo lato, anticè truncato; aperturâ communi posticâ.

SYNONYMS AND REFERENCES.

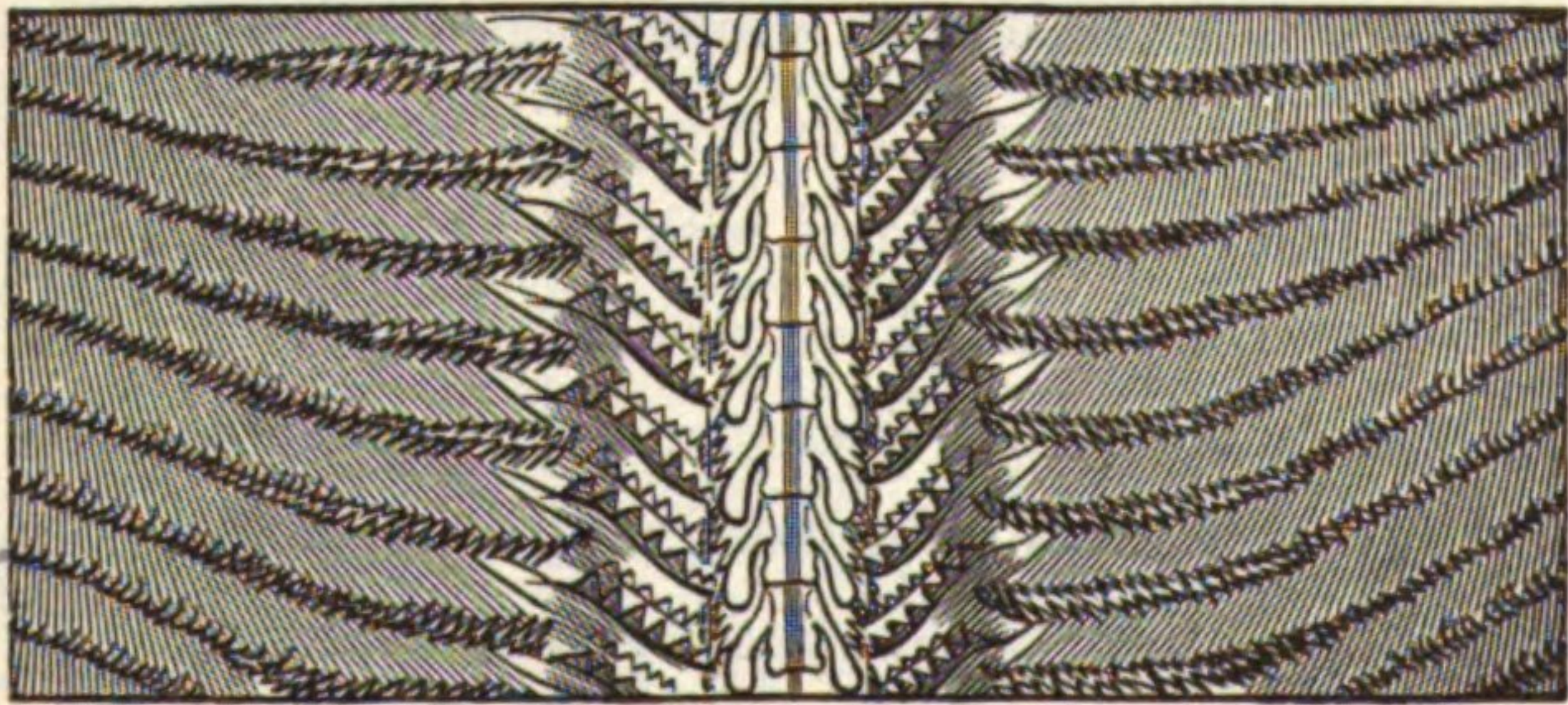
Limax Columbianus, GOULD, MS. of Mollusca of the U. S. Exploring Expedition.

Color a dark, dirty, greenish yellow, either uniform or in some varieties clouded with large, purplish-black, irregular blotches. The body is large and corpulent, the anterior portion elevated, with the back rounded, and the posterior portion strongly carinated; at the posterior tip there is apparently a mucus pore. The margin of the foot extends beyond the mantle and forms a ruffle around the animal, with transversely oblique markings. The surface is tessellated with coarse, elongated papillæ arranged longitudinally. The cuirass is broad, truncated in front, minutely granulated with the respiratory orifice at the posterior third. Face vertically wrinkled: upper tentacles rather short, thickened at base, colored like the body and finely granulated; lower tentacles long and slender. Length, five and one half inches.

GEOGRAPHICAL DISTRIBUTION. This fine American species was found on the western coast of North Amer-

ica, at Nisqually by Lieut. Case, and at Discovery Harbor, Puget Sound, by Mr. Dyes.

REMARKS. There can be no doubt that the mottled animals are varieties of the uniformly colored ones, because they were not only taken in company, but in coitu. A smaller specimen is of a uniform slate color. It generally resembles *A. empiricorum* in form, marking, and coloring, with the exception of the head, which in that species is slate-colored. The position of the respiratory orifice is also much more anterior. No land mollusk has yet been found to the west of the Rocky Mountains identical with any species on the Atlantic side; and although several European slugs have been carried to distant shores, where they have become naturalized in limited districts, it is too much to suppose that any of them have thus become numerous at several localities about Puget Sound.



FAMILY II.

HELICIDÆ.

THE SNAILS.

CHARACTERS. *Animal.* Having the body divided into two distinct parts; the one consisting of a membranous sack, and including most of the viscera, is arranged in a spiral form within the convolutions of the shell; the other comprising the head, the anterior portions of the organs of digestion and generation, and the locomotive disk, is elongated, sub-cylindrical, covered with a glandular membrane, and resembles in its external characters, the animals of the family of *Limacidæ*; it can be retracted entirely within the shell. The junction of the two parts is encircled by a fleshy contractile process or *collar* which is expanded into, and fills up, the aperture of the shell. Tentacles four, the two superior long and cylindrical, terminating in bulbs containing the ocular points; the two inferior short, and more or less conical. In some of the genera there are buccal appendages, or prolongations of the external membrane near the mouth, of various shape, but in the genus *Glandina* taking an elongated, curved form, resembling a third

pair of tentacles. Respiratory foramen or cleft, in the collar at the angle of the aperture of the shell, with the anal orifice immediately adjoining. Organs of generation uniting at a single outlet, and opening on the right side, usually a little behind the superior tentacle, but sometimes as far back as the collar. Hermaphrodite, but requiring a double union. Herbivorous or carnivorous.

SHELL. Always spiral, but variable in form, covering the animal entirely, without operculum.

GEOGRAPHICAL DISTRIBUTION. The *Helicidæ* are spread throughout the tropical and temperate regions on the continents, and islands. They are most numerous near the equator, and diminish in numbers towards the north, until, in the colder latitudes of the temperate zone, they become rare, and are believed to be entirely wanting in the arctic circle. Their distribution in the United States, according to their genera and species, has been exhibited in the tables given in the introduction ; but it may be repeated here, in a more condensed shape. *Vitrina* is exclusively a northern genus, and has not yet been noticed south of 44° of north latitude. *Glandina* is quite as exclusively a southern genus, and is confined to the alluvial lands on the southern Atlantic coast, and the shores of the Gulf of Mexico. *Bulimus* is also a southern genus, though having a much wider range than *Glandina*, yet *Bulimus harpa* may be an exception, and so far as known, is found only in the more northern local-

ities. Possibly, it belongs to the genus *Pupa* rather than to *Bulimus*. The introduced species *Bulimus lubricus* is everywhere diffused, but it differs in some respects from the true *Bulimi*, and may be considered to be the type of a sub-generic group. *Helix* is plentifully distributed in the whole territory, except in the extreme north and the extreme south; the difference in the two stations being, that each species declines numerically in the north, while at the south many of them disappear entirely, but are replaced by a smaller number of species, better suited to the climate. *Helix rhodocheila* for instance, is exclusively a southern species, and has thus far been met with only in the southern part of the peninsula of Florida, and the adjacent islands. Still further north, the polygyral *Helices* prevail, and then appear the great mass of species which occupy nearly the whole area of country up to the Great Lakes. *Succinea* is everywhere disseminated, its distribution being as universal as its forms are unvarying. It is probably the most universally disseminated genus. Of the distribution of the genera and species occupying the country west of the Rocky Mountains, we know but very little.

HABITS, &c. The manner of life of the *Helicidae* has been described, in general terms, when treating of the habits of the whole order. They were said to live mostly in the forest, sheltered under the trunks of fallen trees, layers of decaying leaves, stones, or in the soil itself. In these situations they pass the greater part of

their lives. In the early days of spring, they sometimes assemble in considerable numbers, in warm and sunny situations, where they pass hours in indolent enjoyment of the warmth and animating influence of the sunshine. Whether these meetings serve any useful purpose in the economy of the animal, or are caused by the pleasurable sensation, and renewed strength derived from the warmth of the situation after the debility of their winter's torpidity, is uncertain; it is probable, however, that they precede the business of procreation. It is certain that they last but a short time, and that after early spring, the animals are to be found in their usual retreats.

In the course of the months of May or June, earlier or later, according to the locality and as the season is more or less warm, they begin to lay their eggs. These are deposited, to the number of from thirty to fifty and even more, in the moist and light mould, sheltered from the sun's rays by leaves, or at the side of logs and stones, without any order, and slightly agglutinated together. The depth of the deposit is usually measured by the extreme length of the animal, which thrusts its head and body into the soil to the utmost extent, while the shell remains at the surface; but sometimes the animal burrows three or four inches deep before making the deposit, in order to insure a sufficiently moist position. Three or four such deposits, and sometimes more, are made by one animal during the summer and autumn. When the deposit is complete it is abandoned by the animal. The eggs vary in size according to the magni-

tude of the species producing them. They are nearly globular, one axis being somewhat longer than the other, white and opaque. They consist, in general, of an external, semi-calcareous, elastic membrane investing the whole, the interior surface of which is usually studded with numerous rhombic, microscopic crystals of carbonate of lime, some species however having a hard enveloping calcareous shell, of the consistence of that of a bird's egg; of an inner thin, transparent, shining membrane which immediately encloses a transparent and somewhat viscid fluid, analogous to the albumen of bird's eggs; of the albumen itself, and of the vitellus, which, possessing the same degree of transparency as the albumen, cannot be distinguished from it at this time. The elastic eggs when first laid are often flaccid, and seemingly only half full of fluid, but they soon absorb moisture and become distended. The embryo animal, with its shell, is observable in the albuminous fluid in a few days after the egg is laid. Its exclusion takes place, under ordinary circumstances, in from twenty to thirty days, according to the state of the atmosphere. Warmth and humidity hasten the process, while cold and dryness retard it to an almost indefinite extent. The hatching of eggs laid late in the autumn is often interrupted by the approach of cold weather and of snow, and delayed until the next spring.

The young animal gnaws its way out of the egg, and makes its first repast of the shell which it has just left. It consists at first of about one and a half whorls, the

umbilicus being minute, but open. Its growth is rapid, and it has usually increased in magnitude three or four times, before the close of the first year.

In the month of October, or at the epoch of the first frost, the snail ceases to feed, becomes inactive, and fixes itself to the under surface of the substance by which it is sheltered, or partially burrows in the soil, and with the aperture of the shell upward, disposes itself for its annual sleep or *hybernation*. Withdrawing into the shell, it forms over the aperture a membranous covering, consisting of a thin, semi-transparent mixture of lime mucus or gelatine, secreted from the collar of the animal. This membrane is called the *epiphragm*. It is formed in this manner. The animal being withdrawn into the shell, the collar is brought to a level with the aperture, and a quantity of mucus is poured out from it and covers it. A small quantity of air is then emitted from the respiratory foramen, which detaches the mucus from the surface of the collar, and projects it in a convex form, like a bubble. At the same moment, the animal retreats further into the shell, leaving a vacuum between itself and the membrane, which is consequently pressed back by the external air to a level with the aperture, or even further, so as to form a concave surface, where, having become desiccated and hard, it remains fixed. These operations are nearly simultaneous, and occupy but an instant. As the weather becomes colder the animal retires further into the shell, and makes another septum, and so on, until there are sometimes as many as six of these partitions. The circu-

lation becomes slow, the pulsations of the heart, which in the season of activity vary from forty to sixty in a minute, according to the temperature of the air, decrease in frequency and strength, until they at length become imperceptible. The other functions of the body cease, and a state of torpidity succeeds, which is interrupted only by the reviving heat of the next spring's sun. During the months of April or May, on the accession of the first warm weather of the season, the animal breaks down and devours the membranous partitions, and comes forth to participate in the warmth and freshness of the season. At first it is weak and inactive, but recovering in a short time its appetite, resumes its former activity.

The season of hybernation continues from four to six months. The final cause of this extraordinary condition is undoubtedly to enable the animal to resist successfully the extreme reduction of temperature, and to survive through the long period when it must, in northern climates at least, be entirely destitute of its usual food. With a view to the first purpose, a place of shelter is provided, and the aperture of the shell is hermetically sealed by the epiphragm or the hibernaculum; for the second, the state of torpor is adopted, during which the functions of digestion, respiration, and circulation being suspended, and all the secretions and excretions having ceased, there is no drain upon the strength and vitality of the animal, and no exhaustion of its forces. Hence it comes forth, at the end of the period, in much the same condition in which it commenced it, and resumes almost

immediately its usual functions and habits. So entire is the cessation of the function of respiration, that the air contained between the epiphragm and the animal is found to be unchanged. The circulation, however, may be partially restored by a small degree of heat, the warmth of the hand being sufficient to stimulate the heart to action.

GENUS VITRINA, DRAPARNAUD.

GENERIC CHARACTERS.

ANIMAL. Body elongated, limaciform; mantle covering the back and neck, and extending to the base of the superior tentacles, with one or more processes or prolongations of its margin, which are reflected upon the shell. Inferior tentacles very short. Respiratory orifice in the mantle, behind its usual position in the *Limaces*. Generative orifice behind and below the superior tentacle.

SHELL. Small, depressed, very thin, shining. Whorls two to three, the last very large. Aperture wide, rounded-ovate. Axis imperforate. Peristome acute.

GEOGRAPHICAL DISTRIBUTION. Inhabits the north-eastern and north-western sections of the United States. So far as noticed it is not widely diffused. It is found on every continent unless it be New Holland, and on

very many of the islands of both the Atlantic and the Pacific.

REMARKS. This genus, as before observed, is a connecting link between the *Limacidæ* and the present family. In addition to the anterior part of the mantle, which, as in that family, lies upon the back and extends to the head, there are one or more processes or prolongations of its margin, narrow and somewhat tongue-shaped, which are given off from its anterior and posterior parts, and reflected back over the shell, the periostraca of which they protect from the adhesion of foreign matter, and retain in a smooth and polished condition. The respiratory orifice is in the mantle, on the right side, but posterior to its position in the *Limaces*. The tentacles are short compared with those of *Helix*, and the inferior pair especially so. The upper surface is covered with minute glandular granulations and furrows, and moistened with a limpid mucus. It is asserted by many authors, that the animal can withdraw itself only partially into its shell; but this must be an error, for M. Nilsson declares most positively of *Vitrina pellucida*, and Mr. Lowe* of *Vitrina lamarckii*, that the shell can contain the entire body. Its aspect when in motion is that of a *Limax* bearing the shell of a *Helix* upon its back.

The genus is one preferring a low temperature, occupying, in Europe, the northern countries, and when found

* Zoölogical Journal, iv. p. 338.

in southern latitudes, confined to an altitude of from two thousand to five thousand feet above the sea. On the American continent it has been observed as far north as Greenland. The most recent observations render it probable that it is carnivorous.

The type of the genus is *Helix pellucida*, Müller. The genus itself was proposed in 1805, by M. Draparnaud, who was the first to see the propriety of separating it from *Helix*; M. Férussac soon after suggested the same genus under the name of *Helico-limax*. The name of M. Draparnaud has universally obtained, and the genus has been adopted by all the naturalists of the day. Its only essential distinction, however, is the prolongation of the mantle or collar into a free and unattached lobe, which lies over the back, and thus resembles the mantle or cuirass of the *Limaces*; it is however but a resemblance. It connects *Vitrina* to *Limax* by analogy, but not by affinity; for the uses of the organ are very different from those of the true mantle of *Limax*. In the latter it affords a partial protection to important viscera which, in this genus, are much more effectually protected by the shell. Processes of the mantle, of various extent and form, exist in several species of *Helicidæ*, and without doubt, differ in development in the different species of this genus. Their uses are for the most part unknown, though they do not seem to serve any important purpose in the economy of the animal. It is not easy to see, therefore, why a generic distinction, founded upon a greater or less development of these parts, should be

more valid than one founded upon the absence of so important organs as the lower pair of tentacles, a departure from the structural type of the family, which is always accompanied by the modification and adaptation of some other organ to perform their usual functions.

The general structure of the animal is like *Helix*, and as in that genus, as well as in *Limax*, there are species which possess a terminal mucus pore like *Arion*. To these M. Férussac gave the name of *Helix-arion*, while he retained the name of *Helico-limax* for those which, like the true *Limax*, are destitute of the terminal sinus or pore.

The species hitherto discovered are few, and do not appear to be so prolific as the other genera, hence they are not numerous in individuals.

1. VITRINA PELLUCIDA, MÜLLER.

PLATE LXVII. a. FIGURE 1.

V. testâ sub-depressâ, tenuissimâ, hyalinâ, nitidâ, imperforatâ; anfractibus tribus convexiusculis; aperturâ sub-ovatâ, obliquissimâ; peristomate simplici.

SYNONYMS AND REFERENCES.

Vitrina pellucida, SAY, Exped. St. Peters. II. p. 258.
ADAMS, Shells of Vermont, p. 12.

DESCRIPTION.

ANIMAL. Whitish, grayish, or blackish, large compared with the shell. Head, tentacles, and eyes black; inferior tentacles very short. The prolongation of the

mantle extends from under the shell, over the back and neck to the base of the tentacles, but is unattached and free; from the right side of the mantle posteriorly, there arises a tongue-shaped process, which is reflected back upon the shell, and reaches to the spire. Respiratory foramen in the posterior part of the mantle.

SHELL. Globose-discoid, thin, fragile, transparent, shining; whorls two and a half to three, scarcely convex, with very minute lines of increase, the last whorl large, and much expanded. Suture not much impressed, sometimes with an impressed line revolving near it; aperture large, sub-ovate, somewhat diminished by the intrusion of the penultimate whorl. Peristome thin and acute, the columellar margin a little reflected. Axis imperforate. Greatest transverse diameter nearly one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. This species was first noticed in the United States by Mr. Say, near Coldwater Lake, North-western Territory, in latitude $48^{\circ} 45'$ North, and between that point and Lake Superior it frequently occurred. Prof. C. B. Adams has recently discovered it on Rogers' rock, an island at the north-eastern extremity of Lake George, in latitude 43° north. It has likewise been found in considerable numbers in the vicinity of Portland, by Dr. J. W. Mighels; it is said to occur also, in the north-eastern part of Maine.

REMARKS. It is found under stones, decaying leaves,

and rotten wood. Its geographical distribution denotes that it is a hardy species. When kept in confinement it has not been noticed to feed upon vegetable matters placed within its reach, and it has been detected in several instances preying upon dead, and even upon living earth-worms. It is hence inferred, with some probability, that its habits are carnivorous. Observations upon *Vitrina lamareckii* tend to confirm this opinion. It is said to deposit its eggs, which are nearly globular, in the autumn. They are placed under decaying leaves, and stones, and in the soil, in parcels of ten or fifteen, slightly agglutinated together; they are hatched in from fifteen to twenty days, and acquire their full size and maturity in eight or ten months. The animal is active, moving with rapidity, and particularly vivacious in rainy weather. M. Bouchard-Chantereaux, who observed great numbers of *V. pellucida* withdrawn into their shells, dying and dead, in the month of January, supposes that their term of life is from one year to fifteen months, and that they die after having completed their deposit of eggs. This, however, is only problematical, as great numbers of other species of *Helicidæ* are cut off by the severe weather of the winter, before they have provided themselves with sufficient shelter.

[Having had opportunities for a more critical comparison of the European and American shells, I am induced to believe that they are different species. It is true that *V. pellucida* is known to vary rather widely in

size, form, and color. But I find differences in the shells of the two continents in these respects, which are constant. The American shell is more globose; the plane of the aperture is more oblique, and the basal portion of the lip sweeps round from the columella in a rapidly curving arc, instead of stretching off almost horizontally; indeed, the whole aperture is more rounded. These differences become quite conspicuous when the shell is greatly enlarged. The color of the European species is always more or less green or yellow, whereas, all the American specimens are colorless, and decidedly thinner. In size, our shells are about one quarter smaller than the foreign ones, and invariably have half a whorl less, two and a half, even when shells of the same size are compared. The suture, in the true *V. pellucida* when closely examined, is found to be much excavated, and barred with transverse septa. Mere vestiges of these characters appear in the American shell. It is more nearly like *V. sub-globosa*, Mich., which, however, has the spire much more elevated, and its basal face much more inflated.

These differences, in a genus where marked specific characters are rarely found, together with the fact that our shell inhabits a remote continent, on which it ranges for more than a thousand miles inland, it appears to me are sufficient to authorize us to regard it as distinct from the European shell; and I would propose for it the name of *V. limpida*, in the expectation that my diagnosis will be confirmed by the observations of others. — G.]

GENUS SUCCINEA, DRAPARNAUD.

GENERIC CHARACTERS.

ANIMAL. Resembling the animal of *Helix*, but shorter. Superior tentacles short, expanded at their base or conoid; inferior pair very short and small. Respiratory foramen in the mantle, in the angle at the posterior part of the aperture of the shell.

SHELL. Shell ovate-conic, generally amber-colored, thin, translucent; periostraca smooth and shining. Whorls about three, increasing rapidly from the apex to the aperture; the last whorl comprising three-fourths of the volume of the shell; spire pointed. Aperture very large, longer than wide, a little oblique, rounded anteriorly and angular behind. Peristome thin, acute, not reflected. Axis imperforate.

GEOGRAPHICAL DISTRIBUTION. The species of this genus inhabit nearly all the temperate regions of the earth, and portions of the intertropical countries and islands. At the Navigator and Friendly Islands they are quite numerous. They are found in nearly every part of the United States and of North America.

REMARKS. The genus includes a natural group of mollusks, which affords in the characters of the shell, the means of readily distinguishing it from other genera, and yet hardly supplies structural differences in the animal sufficient to authorize its removal from *Helix*. It

was first separated from the latter genus by M. Brugière, who included it in his genus *Bulimus*. M. Draparnaud, dissatisfied with this arrangement, which brought together species connected only by loose analogies, instituted the present genus, the type of which was *Helix succinea*, Müller, (*Helix putris*, Lin.) and hence the specific name of M. Müller was adopted as the generic term. About the same time, M. Lamarck, ignorant apparently of what had been done by M. Draparnaud, proposed his genus *Amphibulimus*, founded on another species evidently belonging to the same generic group. The propriety of the generic distinction was generally admitted, and the name of M. Draparnaud was preferred. M. Férussac, not finding the anatomical characters of the genus sufficiently different from those of *Helix* to justify its continuance, according to his views, formed of it a subordinate division of his great genus *Helix*, with the title of *sub-genus*, under the name of *Cochlohydra*. The system of M. Férussac, however, not having been generally adopted, either within or out of France, the genus *Succinea* is very generally retained, and will probably keep its place, from considerations of convenience if from no other, until the principles of classification shall be placed on a certain basis. M. Deshayes, with whom the ideas of M. Férussac found but little favor, seems to intimate indeed, that the anatomical peculiarities of *Succinea* are sufficient to confirm the distinction.¹ He asserts that he found important differ-

¹ Lamarck, 2d edit., Art. *Succinea*.

ences in the structure of the organs of generation, and notices the absence of the organs called by M. Cuvier, *vesiculæ multifidæ*, of the *dart*, and of the *sack* or *pocket* in which the dart is contained. The want of these is, however, by no means peculiar to *Succinea*. They are equally wanting in all but one of the American species of true *Helices* which have as yet been examined. M. Deshayes here falls into an error too common among naturalists, that of generalizing too much upon the few species with which they are most acquainted.

The habits of the animal do not vary much from those of *Helix*. They are described in many works as being amphibious, which means that they possess the power of living in the water as well as upon the land. Such appears to have been the opinion of M. Lamarck. They are not, however, in any proper sense amphibious, as they live upon the land exclusively, and breathe air; and some of them occupy situations very distant from bodies of water. It is not difficult, however, to account for this general belief. Some of the species inhabit wet localities at the borders of swamps and ponds, and are even found attached to the leaves of plants growing out of the water. They resemble also, in external characters, certain species of *Limnea*, which live in the water itself. The two have, therefore, been confounded in popular belief.

It is also stated very generally, that they cannot withdraw their bodies entirely into their shells. This is certainly an error as regards the American species, and

probably as to all others. They all retire into their shells on the approach of winter, and during seasons of drought; every part of the body is then retracted within the plane of the aperture, and over it is extended a membranous epiphragm, like that of our *Helices*. They cannot, however, retract the body much beyond the plane of the mouth, and the foot is never wholly drawn into the aperture of the mantle and concealed by it as in *Helix*; the posterior extremity of the locomotive disk being always visible, on a level with the mantle or collar. The epiphragm sometimes possesses considerable thickness and consistence.

Nearly all the acknowledged species of this genus inhabiting the United States were early described by Mr. Say, and were characterized with his usual care. After the publication of these, and until the period of his death, there was an interval when conchology was but little cultivated, or at least, during which no works appeared embracing this genus. Since that time a new generation of naturalists has come forward, mostly in the northern States, who are diligently engaged in investigating the zoölogy of the country. To them the works of Mr. Say have been almost the sole guide; but the only depositories of authentic specimens of his species being the museum of the Academy at Philadelphia, and the private cabinets of his friends and contemporaries in the same city, such specimens have remained almost unknown elsewhere. Observers seeking to identify species coming into their hands with those of Mr. Say, have,

in the absence of such means of comparison, been compelled to rely on descriptions alone, and consequently some errors have been committed; and there is a want of a common understanding as to the species referred to by him, under his respective names. And Mr. Say himself, preparing his descriptions under inconvenient circumstances, and at great intervals of time and position, has apparently sometimes repeated his own species. Owing to the slight variation of specific form which prevails in the *Limacidæ* and in this genus, it is in these that the greatest amount of discrepancies occur. We give here Mr. Say's names and descriptions.

- "*Succinea ovalis*. Shell sub-oval, pale yellowish, diaphanous, very thin and fragile, with nearly three oblique volutions. Body very large. Spire small, but little prominent, somewhat obtuse. Aperture longitudinally sub-ovate, large. Columella much narrowed, so as almost to permit the view of the interior spire. Length nine-twentieths. Aperture seven-twentieths of an inch.
- "*Succinea campestris*. Shell oval, very fragile, whorls three, not remarkably oblique; pale yellowish, with opaque white and vitreous lines irregularly alternating. Length not quite three-fifths; breadth seven-twentieths of an inch.
- "*Succinea avara*. Shell sub-oval, pale reddish yellow, sub-diaphanous, fragile, covered with an earthy crust; whorls three, minutely wrinkled; body whorl very large; spire small; aperture large, sub-ovate, about two thirds of the length of the shell. Length three-twentieths of an inch.
- "*Succinea obliqua*. Shell oblong-oval, nearly pellucid, pale amber-colored; whorls three, very obliquely revolving, distinctly wrinkled; spire a little prominent; aperture sub-oval, somewhat oblique. Length seven-tenths of an inch.

“*Succinea vermeta*. Shell sub-oval, yellowish, very thin and fragile, somewhat diaphanous, with nearly three very oblique volutions; whorls very much rounded, wrinkled; suture very profoundly impressed; spire rather prominent and acute; aperture ovate, the superior termination rounded.

“*Succinea undulata*. Shell sub-oval, pale yellowish, translucent, fragile; volutions three and a half. Spire moderate, obsolete; body whorl wrinkled, or rather slightly undulated. Columella narrowed, so as to exhibit the appearance of an interior umbilicus. Length half an inch.”

Considerable confusion prevails in the use of the names of these species, and we attempt to reconcile the differences in the following manner.

Succinea campestris, Say, is an exclusively southern species. The shell commonly mistaken for it is the species which Mr. Say called *ovalis*, and which most resembles it. Consequently the occurrence of *Succinea campestris*, Say, in the works of Messrs. Gould, Mighels, and Sager is erroneous. We confine the use of that name to the southern species.

Succinea ovalis, Say. This species, diffused universally in the middle and northern States of the Union, is that which is described in the works of Messrs. Gould, Mighels, Kirtland, and Sager, as *Succinea campestris*, Say. It varies much in size, and in the divergence of the last whorl from the axis of the shell, and this last variation when strongly developed constitutes *Succinea obliqua*, Say. *Succinea ovalis* of Messrs. Gould, Adams, Mighels, and Sager is *not* the *ovalis* of Say,

but a species which was unknown to him. As, however the *ovalis* of Gould is that now most commonly known under the name of *Succinea ovalis*, we propose to retain it, and to apply to Mr. Say's species, his second name, *obliqua*.

Succinea avara, Say. The received opinion is, that this is a well-established species, founded, however, on a young shell, and that the mature shell was afterwards characterized by Mr. Say, as *Succinea vermeta*. We propose to retain for it the earliest name, *avara*.

Succinea undulata, Say, is a Mexican species, of which specimens do not exist in our cabinets. Judging by the description alone, it may prove to be a variety of *Succinea ovalis*, Say.

Mr. Isaac Lea of Philadelphia has published the following descriptions of North American *Succinea*.

Succinea retusa. Testâ ovatâ, oblongâ, tenuissimâ, pellucidâ, flavidulâ; spirâ brevi, anfractibus binis; aperturâ inferne dilatâtâ et retractâ. *Hab.* Ohio. Diameter, .3; length .7 of an inch.

Succinea aperta. Testâ sub-rotundâ, tenui, flavescente, lævi; spirâ brevissimâ; anfractibus binis, ultimo grandissimo; aperturâ latissimâ. *Hab.* Banks of Columbia river.

Succinea wardiana. Testâ obliquo-ovatâ, sub-nitidâ, diaphanâ, obsolete striatâ, luteâ; spirâ breviusculâ; suturis sub-impressis; anfractibus ternis convexis; aperturâ sub-rotundâ. *Hab.* Ohio.

Succinea totteniana. Testâ obliquo-ovatâ, sub-nitidâ, sub-diaphanâ, obsolete striatâ, corneâ; spirâ brevi; suturis impressis;

anfractibus ternis, convexis, apertura ellipticâ. *Hab.* Rhode Island.

Succinea nuttalliana. Testâ longo-ovatâ, obliquâ, sub-nitidâ, diaphanâ, striatâ, pallido-luteâ; spirâ sub-elevatâ; suturis impressis; aperturâ longo-ovatâ. *Hab.* Oregon Territory.

Succinea aurea. Testâ obliquo-ovatâ, nitidâ, diaphanâ, lævi, aureâ; spira sub-elevatâ, suturis impressis; anfractibus ternis, convexis; aperturâ ovatâ. *Hab.* Ohio.

Succinea oregonensis. Testâ obliquâ, tenui, rugoso-striatâ, rufâ sub-diaphanâ; spirâ exsertâ; suturis valde impressis; anfractibus ternis inflatis; aperturâ magnâ, lato-ovatâ. *Hab.* Oregon Territory.

Succinea inflata. Testâ sub-rotundâ, inflatâ, tenui, lacteâ; spirâ brevi; suturis sub-impressis; anfractibus ternis, sub-rotundatis; aperturâ lato-ovatâ. *Hab.* South Carolina.

Of these species we have seen *S. wardiana*, *S. totteniana*, *S. nuttalliana*, and *S. aurea*; we have no knowledge of the others except what we derive from the descriptions and figures. On a careful examination of these, it appears to us that *S. aperta* and *S. aurea* are well-established species; that *S. wardiana* is synonymous with *S. avara*, Say; *S. totteniana* with *S. ovalis*, Say; *S. nuttalliana* with *S. ovalis*, Gould; *S. inflata* with *S. campestris*, Say; that *S. retusa* is probably synonymous with *S. ovalis*, Gould; and that *S. oregonensis* cannot at present be ascertained. We cannot, however, include *S. aperta*, Lea, in this work, in consequence of the rule we have adopted, not to insert any species which we have not ourselves seen and examined.¹

[¹ In reference to the above synonymy it may be remarked, that

Dr. DeKay also indicated a new species in his "Report," under the name of *Succinea lineata*, but as it does not appear in his final Report, we presume it was subsequently regarded as merely a variety.

SUCCINEA CAMPESTRIS, SAY.

PLATE LXVII. *b*. FIGURE 1.

S. testâ ovato-inflatâ, albidâ, rugosulâ ; anfractibus tribus, ultimo anfractu ventricosus ; spirâ brevi, apice acuto ; apertura orbiculato-ovatâ ; peristomate acuto.

SYNONYMS AND REFERENCES.

Succinea campestris, SAY, Phil. Journ. i. p. 281, an. 1818.

FÉRUSSAC, Tab. Syst. p. 31, Hist. pl. 11, fig. 12.

Succinea inflata, LEA. Proceedings, &c. p. 32.

DESCRIPTION.

ANIMAL. "Whitish ; eyes, inferior tentacula, and a line passing from the eyes disappearing under the shell, black ; a gamboge-colored vitta is visible through that part of the shell which is opposed to the mouth."

SHELL. Yellowish-white, or yellowish horn-color, rounded-ovate ; periostraca shining, wrinkled ; whorls

S. aperta is undoubtedly a species belonging to the Sandwich Islands, described by me under the name of *S. rotundata*, in the Proceedings of the Boston Society of Natural History, Vol. II. p. 182. Specimens of *S. Nuttalliana* and *S. oregonensis* having been furnished by Mr. Lea, leave no doubt as to their being decidedly well-marked species, and they will therefore be included among the other species described. Some other species collected by Mr. Bartlett in Texas, have also been added. — G.]

three, not oblique, the last whorl large and ventricose, the other two constituting the spire, small, short, with acute apex; aperture ample, not much elongated, rounded anteriorly; peristome thin and sharp.

“Length, not quite three-fifths; breadth, seven-twentieths of an inch.”

GEOGRAPHICAL DISTRIBUTION. Mr. Say makes the following statement. “This shell is extremely common in many parts of the Southern States; it abounds in the sea islands of Georgia, in the low, marshy grounds behind the sand hills of the coast, where they are destroyed in great numbers by the annual conflagration of the old grass; on Amelia Island in East Florida, I found them in plenty on the highest sandy ground of the island. On Cumberland Island, in Mr. James Shaw’s garden I obtained several specimens from the leaves of radishes.” It was found by Mr. Bartlett in many parts of East Florida.

REMARKS. Mr. Say observes further concerning this species. “The resemblance between this species and the *ovalis* is very great; it differs, however, in being less elongated, and of a more robust form; the revolution of the spire is much less oblique, the shell itself is thicker and less fragile.” These remarks indicate sufficiently the distinctive characters of the species. The numerous specimens we have now seen leave no doubt as to their characters. They are short, rounded, and ventricose, the surface is unequally wrinkled, and there is more cal-

careous matter in the shell than in the other species. When somewhat advanced in age they want the peculiar transparency and delicate periostraca common to other species of the genus, and in general aspect are not unlike some *Bulimi*. If differences are admitted, where all are so much alike, this southern species is unquestionably different from any of its northern congeners.

The shell described by Messrs. Gould and Mighels, and that indicated by Dr. Sager, by name, as *Succinea campestris*, is in our opinion not the shell described by Mr. Say under that name.

2. SUCCINEA OBLIQUA, SAY.

PLATE LXVII, b. FIGURE 3.

S. testâ ovatâ, lymnæ-formi, tenui, pellucidâ ; anfractibus ternis vel quatuor convexis, ultimo anfractu magno ; aperiturâ ovali, obliquâ ; spirâ brevi.

SYNONYMS AND REFERENCES.

Succinea ovalis, SAY, Phil. Journ. I. p. 15, II. p. 163.

KIRTLAND, Loc. cit. p. 173.

FÉRUSSAC, Tab. Syst. No. 8, pl. 11, A., f. 1.

LAMARCK, 2d edit. VIII. p. 319.

Succinea obliqua, SAY, Exped. St. Peters, II. p. 260, pl. 15, f. 7.

ADAMS, Shells of Vermont, p. 6.

DE KAY, Loc. cit. p. 31.

Succinea campestris, GOULD, Inverteb. of Mass. p. 195, f. 126.

SAGER, Loc. cit. p. 11.

MIGHELS, Loc. cit. p. 28.

Succinea totteniana, LEA, Proceed. Amer. Philos. Soc. II. 31 - 2.

DESCRIPTION.

ANIMAL. Superior tentacles blackish, their base

large and conical, lower tentacles under the upper, white, very small. Head and neck finely mottled with black, mantle grayish, foot light saffron-color, a saffron border around the respiratory foramen. A deep furrow running from under the anterior part of the mantle, on each side, downward and forward, terminating behind the inferior tentacle. Length of the animal somewhat more than that of the shell.

SHELL. Ovate, pale green, yellowish green, amber-colored, or cuneous, very thin and fragile, pellucid, sometimes roseate at apex. Periostraca shining, minutely wrinkled or striated. Whorls rather more than three, the last very large, and much expanded, and more or less oblique; spire very small, not prominent nor pointed; suture distinct, impressed. Aperture oval, large and expanded, more or less oblique; columellar margin with a slight testaceous glazing; columella thin, sharp, narrowed; peristome thin, its edge blunted by the reflection of the periostraca.

Greatest length about one inch, ordinary length three-fourths.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the northern and middle States from Maine to Missouri. We have noticed it as far south as Arkansas.

REMARKS. The shell of this species, as it usually occurs in the northern States, is extremely delicate, consisting merely of a transparent periostraca, with only cal-

careous matter enough to give it consistency. In the western States, and especially on the banks of the Mississippi it acquires more lime, and becomes somewhat robust, and attains its greatest size. The largest specimens we have seen, measuring one inch in extreme length, were taken from the oozy mud left by the Mississippi in low places, by an inundation. Like the other species, it prefers moist situations, but it is also spread abroad upon the hill-sides, as in Vermont, at considerable distances from water.

When the shell is oval, the last whorl very ample and expanded, forming nine-tenths of the whole volume, and but little oblique, the spire being at the same time very small and not prominent, and the aperture oval and well rounded at both extremities it is the form described as *Succinea ovalis* by Mr. Say. The variation to which it is most subject is a lengthening and narrowing of all its parts. The spire becomes more produced, and its convolutions less close; the last whorl is compressed at the sides, and more oblique. The aperture by this process becomes elongated and narrow, and its posterior margin more angulated. In this condition it is *Succinea obliqua*, Say. The extremes of the two varieties differ much from each other, yet they are blended together by almost inappreciable degrees of variation, and we have never met with specimens in the northern States which could not be referred to one or the other of these varieties.

Occurring as this species does, plentifully, over a great part of the Union, and therefore everywhere

accessible for comparison, and presenting only a limited amount of variation, which in any other genus would not produce inconvenience, there has nevertheless been a good deal of uncertainty in the identification of it. It has been taken for both the species which we consider synonymous, as its characters may have leaned to one or the other. It is thought to be *Succinea campestris*, Say, by those who consider this to be a northern species; and it is unquestionably *Succinea totteniana*, Lea.¹ It is thus the representative of four nominal species, and perhaps of even more. That we have made no mistake, and that the shell described by Mr. Say as *Succinea ovalis* is the same as that called by Drs. Gould and Mighels *Succinea campestris*, is rendered certain by inspection of the original specimens labelled by Mr. Say, and by others from the contemporary collections of Mr. Hyde, and of Dr. Griffith, as well as by familiar acquaintance with the cabinets of the two former. That *Succinea ovalis*, Say, and *Succinea obliqua*, Say, are synonymous we infer from numerous specimens collected in many parts of the country.

[¹ There seems to be good reason for regarding Mr. Lea's *S. totteniana* as a distinct species. It is a local species, confined, so far as I can ascertain, to the New England States, and east of the Green Mountain range. Compared with *S. obliqua*, the following characters appear constant. It is a thinner and more fragile shell, proportionally more ventricose in form, with a shorter spire and larger aperture; and it has a decided green color almost unshaded with yellow, while in *S. obliqua* the amber yellow predominates. It is hardly to be supposed that either the colder climate or the want of lime could account for a group of such differences, so constant. — G.]

It resembles very closely some forms of *Limnea*.

The identity of the shell commonly known as *S. campestris*, and *S. obliqua*, Say, seems to have been clearly perceived by Prof. Adams, and expressed in both his works quoted by us.

3. SUCCINEA AVARA, SAY.

PLATE LXVII. c. FIGURE 4.

S. testâ parvâ, conicâ, pellucidâ, corneâ, roseâ, aut virescente; anfractibus ternis convexis; spirâ elevatâ, acutâ; suturâ valdè impressâ; aperturâ rotundo-ovali.

SYNONYMS AND REFERENCES.

- Succinea avara*, SAY, Exped. to St. Peters, II., p. 260, pl. 15, f. 5.
 GOULD, Invertebrata, &c., p. 196, fig. 127.
 ADAMS, Shells of Vermont, p. 6.
 KIRTLAND, Loc. cit. p. 173.
 MIGHELS, Loc. cit. p. 28.
Succinea vermeta, SAY, Disseminator, reprint, p. 23.
Succinea wardiana, LEA, Proceed. Am. Phil. Soc. 1841, II. 31. No. 13, p. 31.

DESCRIPTION.

ANIMAL. Head dark, foot flesh-colored, narrow.

SHELL. Rather small, very thin and fragile, straw-colored, rosy, amber-colored or greenish; periostraca shining, or presenting minute hairy processes in the young. Whorls three, very convex, separated by a deep suture; last whorl rather large, not much expanded; spire very prominent, acute; aperture ovate, rounded at both extremities, about half as long as the shell.

Extreme length about one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the northern and middle States; very common.

REMARKS. This shell at first sight appears to be the young of some of the larger species, but it has as many whorls as any of them, though not attaining more than one-fourth part of their size. It differs from all others in having a long and pointed spire, and in its shorter aperture, which is only half as long as the shell. The whorls do not expand so fast from the apex towards the aperture, and the last whorl consequently forms a much smaller part of the whole volume of the shell. One of its characters, but not entirely peculiar to it, is the loose manner in which the whorls are united, the suture being in some instances so deep as nearly to separate them. This variety was considered by Mr. Say to be a distinct species, and described by him under the name of *Succinea vermeta*. We have carefully compared *Succinea wardiana*, Lea, with the present species, but cannot detect any difference.

In the young shells the spire is not so prominent, and the periostraca is covered with numerous fine, hairy processes, as in some *Helices*, which accumulate particles of dirt, which in this way sometimes coat over its entire surface. The apex of the spire is often rosy.

Found under stones and fragments of wood in moist places.

4. SUCCINEA LUTEOLA.

PLATE LXVII. c. FIGURE 1.

Testâ variabili, ovato-turritâ, solidiusculâ, laxè striatâ, extus albâ vel corneâ, sed plerumque lutescente, intus luteâ; anfr. 4, supernis rotundatis, ultimo conico-ovato; aperturâ modicâ, ovatâ, dimidiam longitudinis testæ vix superante; columellâ normaliter arcuatâ, haud plicatâ, ad regionem umbilicalem reflexiusculâ.

SYNONYMS AND REFERENCES.

Succinea luteola, GOULD, Proc. Bost. Soc. Nat. Hist., June, 1848.

DESCRIPTION.

SHELL of a conical, turreted form, sometimes rather corpulent, and again quite slender, the last whorl being much less ventricose in proportion than the upper ones, rather thick in substance; color, when young, pale yellowish green or drab, becoming bleached or gray with age, the interior, however, sometimes having the bright yellow of yolk of egg, and always more or less tinted thus when living, becoming at last dead white; surface irregularly and loosely wrinkled; whorls four, forming a well-proportioned spire, the upper ones well rounded, and separated by a deep suture, the apex acute, colored yellow; last whorl conical at its upper third; aperture ovate, rather more than half the length of shell, the lip somewhat incumbent; columella without a fold, rounded, its edge above being seen winding far within the spire.

Length, half an inch; breadth, one-quarter of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Florida, and more abundantly in Texas, especially in the region of Galveston.

REMARKS. This species is very variable in its proportions, but is easily distinguished from our other species by its small aperture, elongated spire, and its color; its golden interior in fresh specimens, instead of the usual silvery lustre, being its principal characteristic. Its characters agree pretty well with a Mexican species described by Mr. Say under the name of *S. undulata*; and if any of our species were in view in that description, it must have been this one. In form it most resembles *S. avara*, but it differs in size and color. The shortest specimens resemble *S. campestris*, but there is no fold of the columella.—[G.]

5. SUCCINEA AUREA, LEA.

PLATE LXVII. c. FIGURE 3.

Testâ elongato-ovatâ, tenui, lucidâ, succineâ, anfractibus tribus convexis, supernè subtabulatis; suturâ impressâ; aperturâ angustâ, ovatâ; columellâ vix plicatâ.

SYNONYMS AND REFERENCES.

Succinea aurea, LEA, Proc. Amer. Philos. Soc. 1841, II. 32.

DESCRIPTION.

SHELL very symmetrical in form, elongated oval, the texture very thin and lucid, and of a clear amber color; whorls three, the suture deeply impressed, and the

whorls a little tabulated posteriorly. Aperture narrow-ovate, acute posteriorly; the columella has an indistinct fold.

Length, three-tenths of an inch; breadth, three-twentieths.

GEOGRAPHICAL DISTRIBUTION. As yet, this species has been found only in the State of Ohio.

REMARKS. This small species is about the size of *S. avara*, but is less ventricose in form, and of a more vitreous structure, and more yellow cast of color. The aperture especially, is far less rounded; indeed, it is more narrow than in any other American species.—[G.]

6. SUCCINEA OREGONENSIS, LEA.

PLATE LXVII. c. FIGURE 2.

Testâ elongato-ovatâ, tenui, croceâ, striis obsoletis remotis cinctâ: spirâ anfractibus tribus rotundatis; suturâ conspicuâ; aperturâ ovatâ; columellâ arcuatâ, absque plicâ, vitreâ.

SYNONYMS AND REFERENCES.

Succinea oregonensis, LEA, Proc. Amer. Philos. Soc. 1841, II. 32.

DESCRIPTION.

SHELL elongated ovate, thin, of a somewhat saffron-yellow color, rather coarsely, though obtusely and distantly striated transversely. Spire with two and a half or three well rounded whorls, separated by a distinct suture, the last whorl seven-eighths the length of the

shell. Aperture two-thirds the length of the shell, strictly ovate, one-third longer than broad; columella arcuate, but not folded, a thin white callus of considerable extent covering it.

Length, one-fourth of an inch; greatest lateral diameter, one-eighth; least, one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found by Mr. Nuttall, in Oregon.

REMARKS. Compared with *S. aurea* it is much smaller, and combines red in its coloration; the aperture is more rounded at base, so as to be more broadly ovate; the whorls are also more rounded. Grains of sand adhere to its surface, much as in the young of *S. avara*, but I can discover no epidermal hairs.—[G.]

7. SUCCINEA OVALIS, GOULD.

PLATE LXVII. *a.* FIGURE 3.

S. testâ oblongo-ovatâ, sub-conicâ, tenui, diaphanâ; anfractibus ternis arctis, minutissimè striatis, ultimo anfractu elongato; aperturâ conico-ovatâ, latâ, ad anfractum anteriorem expansâ.

SYNONYMS AND REFERENCES.

Succinea ovalis, GOULD, Invertebrata, p. 194, f. 125.

ADAMS, Catalogue, p. 270. Shells of Vermont, p. 6.

MIGHELS, Loc. cit., p. 28.

SAGER, Loc. cit., p. 14.

DESCRIPTION.

ANIMAL. A little longer than the shell, whitish or

amber-colored, and translucent, with minute black dots, scattered and in clusters of dots upon the surface, most frequent upon the head and upper part of neck. Foot free from dots. A black line running from the ocular points of the tentacles through their length, and along the sides of the neck to the shell, marking the sheath of the tentacles. Upper tentacles rather short, thick at base, attenuated towards the end, bulb distinct; lower tentacles short, small, and rather conical. Respiratory cleft near the lip of the shell, about midway between its centre and its junction with the last whorl.

SHELL. Ovate, somewhat conic, very thin, pellucid, watery horn color, sometimes tinted roseate; periostraca shining, very minutely striate; whorls three, the last compressed and elongate when viewed above; spire short but acute; suture impressed; aperture produced by a deep truncation of the shell, elongated, more than three-fourths the length of the shell, patulous, expanding anteriorly, exhibiting the interior of the volutions. When viewed on the side of the aperture, the conical shape of the shell appears, the broadest part of the cone is below the centre of the aperture, and it tapers gradually to the apex.

Extreme length about half an inch.

GEOGRAPHICAL DISTRIBUTION. It is diffused abundantly through the northern and north-eastern States.

REMARKS. This is not *Succinea ovalis*, Say. It

appears to have been overlooked until lately, when it was mistaken for Mr. Say's species, from which it differs very considerably, resembling, indeed, *Succinea oblonga*, Drap. more than any other species.

It does not offer any considerable variation except in size, and the greater or less expansion of the aperture, the latter variation affecting its conical figure. When the anterior part of the aperture is not much contracted the body whorl has the appearance of being compressed, and the aspect of the shell is long and narrow. The shell is particularly thin and delicate, so that the color of the animal is seen through it. The quantity of the dotting of the animal varies very much, in some being so thick as to give the whole animal a dark gray color, in others so sparse as to leave them almost white. It appears to prefer the margins of water on wet and marshy ground, especially where there are fragments of wood saturated with water. We are not aware of its having been found in any other situation. It is also frequently taken on the leaves of flags, (*Iris versicolor*,) on the stems of *Pontederia* and other aquatic plants.

It deposits its eggs, to the number of about twenty, enveloped in a mass of thin transparent gelatine, at the foot of aquatic plants. These gelatinous masses are very numerous in this latitude, in the warm days of June. The eggs are oval and transparent.

8. SUCCINEA NUTTALLIANA, LEA.

PLATE LXVII. *a*. FIGURE 4.

Testâ ovato-lanceolatâ, fragili, lucidâ, corneâ, striatâ: spirâ anfractibus tribus, conico-convexis; suturâ impressâ: aperturâ ovatâ; columellâ arcuatâ, tumidâ, haud sinuatâ.

SYNONYMS AND REFERENCES.

Succinea nuttalliana, LEA, Trans. Amer. Philos. Soc., N. S. IX., 4.

DESCRIPTION.

SHELL, lanceolate-ovate, thin and fragile, of a dull horn-color, somewhat rudely undulated by the lines of growth; composed of about three tumid whorls, forming a conical spire, the last whorl constituting nearly the whole shell; suture well marked: aperture nearly two-thirds the length of the shell, ovate, broadly rounded in front, the posterior angle being also somewhat rounded by the abrupt curvature of the lip; columella very gently curved, the region being somewhat gibbous; no fold on the columella, but in the region of the spire it is slightly sinuous.

GEOGRAPHICAL DISTRIBUTION. Brought from Lewis's River, Oregon, by Thomas Nuttall, Esq., and also by the United States Exploring Expedition.

REMARKS. This shell so closely resembles the specimens of *S. ovalis* found in the region of the Hudson and the Mohawk, that it may not be possible to point out any

important difference. The aperture may perhaps be a little narrower, posteriorly, by the rolling in of the lip. It is very similar to *S. oblonga* of Europe, but its outlines being more curved it is consequently less strictly conical. Its principal claim to be regarded as a new species is that it comes from a region whence no other shell common to the Atlantic slope has yet been brought.—[G.]

9. SUCCINEA CONCORDIALIS, GOULD.

PLATE LXVII. *a.* FIGURE 2.

Testâ tenui, lucidâ, obliquè ovatâ, acuminatâ, reflexâ, cereâ et ad apicem rubicundâ, leviter striatâ et lineis obscuris volventibus insculptâ : anfr. 3 perobliquis, supernis parvulis, tumidis ; suturâ profundâ : aperturâ ovatâ, trientes duæ longitudinis testæ æquante, basi rotundatâ ; columellâ arcuatâ, absque plicâ, paululum arrectâ ; intus micante.

SYNONYMS AND REFERENCES.

Succinea concordialis, GOULD, Proc. Bost. Soc. Nat. Hist., June, 1848.

DESCRIPTION.

SHELL, obliquely ovate, elongate, reflexed, apex acute, thin but firm, transparent, shining, feebly striated lengthwise and spirally, color pale honey-yellow, with the tip ruddy ; whorls three and somewhat more, very oblique, the two uppermost very small, outer whorl somewhat compressed above the middle ; suture well marked ; aperture ample, not less than two-thirds the length of the shell, well rounded at base ; columella regularly arcua-

ted, more so than the outer lip, simple, but its upper portion is reflexed and raised so as to form a marginal wall to the aperture, as it enters the shell, and produces a slight fold where it disappears within the spire; a broad, thin callus covers the left margin, which is slightly detached anteriorly, so as to form the rudiment of an umbilicus.

Length, half an inch; breadth, one-third of an inch.

GEOGRAPHICAL DISTRIBUTION. Found near Lake Concordia, in Texas.

REMARKS. At first view this shell might be mistaken for *Limnea columella*. Its color and texture are like *S. amphibia*, from which it differs chiefly in the slight upturning of the edge of the columella lip, the faint revolving lines, and the ruddy apex.—[G.]

GENUS HELIX, AUCT.

GENERIC CHARACTERS.

ANIMAL. Body elongated, semi-cylindrical, tapering to a point posteriorly, convex above, plane beneath, the whole area forming a locomotive disk; integument reticulated by furrows surrounding numerous longitudinal mucus-glands; mantle simple, not extending beyond, and accurately fitting to, the lip of the shell, into which

the whole animal may retire. Head obtuse, without a constricted neck. Tentacles four, retractile, the superior long, slender, terminating in an oculiferous bulb; inferior one short, delicate, but always conspicuous. Lip simple, mouth inferior, armed with a transverse corneous jaw, and containing a lingual organ beset with ranges of numerous hooks or denticles.

SHELL. Form variously discoidal, globose, or conical, the axis seldom equalling the diameter. Aperture generally longitudinal, oblique, circular, lunate or ringent; lip simple or reflexed, not continuous, though often connected by a deposition of enamel; columella continuous with the curve of the lip; throat simple or armed with denticles or lamina. Base perforated or imperforate. Surface without varices or deep sculpture.

GEOGRAPHICAL DISTRIBUTION. This genus inhabits every part of the territory of the United States, as it does every region of the earth where land shells of any kind are found. It may well be called cosmopolite. The genus *Vitrina* alone, may perhaps extend to somewhat higher latitudes and altitudes.

REMARKS. The genus *Helix*, as originally constituted by Linnæus, embraced not only all the *Helicidæ*, but also all the fresh-water univalves, and even some marine genera. It has been successively amended by various authors, especially by Müller, Lamarck, and Draparnaud, so that at least a dozen well characterized genera have

been separated. Even now, it embraces a very great number of widely diversified species, furnishing grounds for numerous subdivisions. Still, there is little difficulty in at once distinguishing the members of this genus from all others, if we except the genus *Bulimus*, with which it seems continuous by means of the groups found in the region of the Philippine Islands. The species inhabiting the United States, however, present no difficulty in this respect. The genus *Carocolla*, which has been pretty generally admitted by conchologists, comprising species with an acute or carinated periphery, is now restored to *Helix*. The mere circumstance of carination seems not to be a sufficient ground for separation; for the young of most species, however globular they may become when adult, are generally carinated; and it does not yet appear that there is any corresponding differences in the structure or habits of the animal. It would not be worth our while however, to attempt to enter into detail respecting the diversity and economy of this great genus as it is found over the wide world; but we will confine our remarks to those members of it with which we are specially concerned, namely, to the groups which inhabit the United States; nor need they be much extended in this place, as we have already dwelt upon the points of principal interest in the history of the snails, in our preliminary remarks on the whole family.

The snails pass the greater part of their lives under dead leaves and logs, under stones, or burrowing in the

ground. They seldom come from their lurking places while the sun shines, and indeed are never seen ranging in the daytime unless the day be damp and dark. Should they then be surprised by the appearance of the sun, they immediately take shelter from its rays, under some cover or on the shaded side of the trunks of trees.

The natural food of the genus is vegetable ; and the formation of the mouth and the organs with which it is armed seems to be peculiarly well adapted for cutting fruits and the succulent leaves of plants. The dental edge of the upper jaw, with its minute serratures, being applied against the substance to be eaten, the semilunar rough instrument, which Spallanzani calls the *tongue*, is brought up against it, cutting out and carrying into the mouth semicircular portions of nutriment. This operation is carried on with great rapidity, and the substance to be eaten soon disappears. It is certain, however, that they are also fond of animal food, and sometimes prey upon earth-worms, their own eggs, and even upon each other ; but the slowness of their motions and their consequent inability to pursue prey forbids the idea of their being dependent on animal food. They, in their turn, become the prey of various birds and reptiles ; and it is no uncommon thing to observe, in the forest, clusters of broken shells lying on logs or stones which have been chosen by birds as convenient places for breaking the shell and extracting the animal.

The snails of the United States are for the most part solitary in their habits, differing very much, in this re-

spect, from the snails of Europe. It is true that in localities favorable for their residence they may be collected in considerable numbers; and especially is this the case in the States north of the Ohio river. But even there, they seem to live independently of each other, and not to unite into herds or communities. There are occasional exceptions however, as in the case of *H. alternata*, very large numbers of which have been observed collected into a small space, especially in winter, as if for the purpose of imparting warmth to each other. The few species of European snails which have been introduced retain their native habits. *H. hortensis* for instance, which has been transplanted to some of the small islands in the vicinity of Cape Ann, is found there in countless numbers, literally covering the soil and shrubs. It is worthy of notice also, that each island is inhabited by a variety peculiar to itself, showing that the variety which happened to be introduced there has propagated itself, without a tendency to run into other variations. Thus, on one islet we have the yellowish green, uni-colored variety, once described as *H. subglobosa*; and on another, within a very short distance, we find a banded variety, and none others.

In regard to colors, our snails are quite plain and exceedingly uniform; in this respect also, differing essentially from the species of the old world. They vary from yellowish-green through horn-color to chestnut, most of them being simply horn-colored. This is perhaps owing to the fact that our species do not infest our gar-

dens and open fields, but are generally confined to forests, sheltered under logs and stones, and are rarely seen abroad except during twilight or on damp and dark days; indeed, they almost entirely disappear as the forests are cut down, and seem to flee the approach of man. The European species, on the other hand, follow in the track of cultivation, and are common in gardens and fields, on walls and hedges, and other places exposed to the action of light. With the exception of *H. alternata* and *H. polychroa*, there is scarcely a species having bands or variegated colors inhabiting the United States proper; and even this latter species can scarcely be regarded as an exception, as it is only to be found at the southern part of Florida, and is more properly a West India shell. In Texas, and beyond the Rocky Mountains in Oregon and California, many of the species have one or more bands.

Another peculiarity of the American snails is the tooth-like appendages with which the aperture of a large proportion of them is armed, and which are characteristic of the group designated by Férussac under the name Helicodonta. More than one-half of the whole number, and more than three-fourths of those with reflected lips, are thus provided. In some species these appendages assume the form of folds rather than teeth; and in others we have simple threads or laminæ revolving within the aperture in the course of the spire. They are not formed until the shell has attained its full growth.

The Helices are found in every region of the United

States, but they are not everywhere equally abundant ; nor do all the species range over an equal extent of territory, some of them being nearly omnipresent, while others are quite local. Thus we have *H. arborea*, *thyroidus*, *tridentata*, and *labyrinthica* over nearly the whole extent of the country ; *H. profunda*, *solitaria*, *intertexta*, *multilineata* confined to the States bordering on the great lakes ; *H. auriculata*, *septemvolva*, *fatigiata*, *mobiliana*, and *rhodocheila* on the confines of the Gulf of Mexico ; *H. spinosa*, *edgariana*, and *cumberlandica* in the region of Tennessee and Georgia ; *H. major* in Georgia ; and so on with other species and regions. The number of species is smaller at the south than at the north, but the number of individuals is greater. In limestone regions, where the materials for the shell are furnished in abundance, as in Ohio and Western New York, snails may be collected in great numbers ; whereas in the granite regions of New England, the collection of a small number is so tedious a task, that it would be fortunate to obtain twenty specimens of the larger species in a day's search.

REMARKS. It forms no part of our object to attempt a division of the genus into lesser groups in accordance with natural characters, as the few species on which we are engaged would not afford the basis for such a division. Numerous subdivisions have already been made, founded upon the shell ; but none of them can claim to represent natural series. We doubt not, however, that hereafter,

when the anatomical structure and embryological development of the animal shall have been more fully investigated, such divisions will be made. The investigations already made by Drs. Leidy and Wyman into the anatomical details of the snails, have not only made it possible to determine the limits of species which could not be satisfactorily settled by the character of the shell alone, but have shown that there are distinct and various types in the structure of the animals; and that for a group of allied shells the animals belonging to them have a peculiar and allied structure also. In confirmation of this we need only to refer to the cuts of the denticles on the tongue of *H. profunda*, *solitaria*, and *multilineata*, of *H. albolabris* and *thyroidus*, of *H. tridentata* and *auriculata*, and of *H. pulchella* and *lineata*, to see that there is no less a correspondence in the forms of the denticles, in these respective groups, than in the conformation of the shells themselves. This is still further evident if we inspect also the viscera, especially the generative system, as seen in the instances of *H. ligera* and *intertexta*, and *H. concava*, *perspectiva*, *solitaria*, and *alternata*, two groups of shells in each one of which there is a peculiar conformation of the viscera, quite different in one from what we find it in the other.

Without attempting to indicate the natural relations of all the species to each other, a few of the principal groups may be noted, in which the species named are evidently allied to each other, though the grouping does not correspond to any arrangement hitherto made.

First in importance, we have the common and more normal form of *Helix*, of which *H. albolabris* may be considered as the type, to which belong also *H. major*, *thyroidus*, *exoleta*, *elevata*, *pennsylvanica*, *columbiana*, *labiosa*, *bucculenta*, *clausa*, *townsendiana*, &c. Some of these are found in every region from the Atlantic to the Pacific, except in the extreme south.

The ringent species, of which *H. tridentata* is the type, embracing that portion of those denominated *Helicodonta*, by Férussac, which are depressed in form and have generally several pointed teeth; such as *H. fallax*, *palliata*, *inflecta*, *loricata*, *dejecta*. In close proximity to these we have a group of which *H. hirsuta* is the type, embracing also *H. spinosa*, *edgariana*, *fraterna*, *maxillata*, and *germana*. Most of these inhabit a wide extent of the country, though none of them are found at the extreme south.

The polygyroid group, on the contrary, is confined to the extreme south, and with its type, *H. fatigiata*, we have *H. septemvolva*, *auriculata*, *pustula*, *vultuosa*, *texasiana*. They are all of a discoidal form, with more than the usual number of whorls, but with considerable variation in the development of the aperture.

Another southern form embraces *H. mobiliana*, *selena*, *saxicola*, and *berlanderiana*, which are small, simple, thin, discoidal shells, entirely different from all the other North American forms.

A peculiar type is found in California, with which *H. aspersa* would be numbered, or still more like *H. aperta*,

such as *H. californiensis*, *nickliniana*, *tudiculata*, and *buffoniana*. They are large, thin, vesicular shells, banded, and with the surface more or less indented.

Another natural group may be instituted having *H. fuliginosa* for its type, associated with *H. lucubrata*, *inornata*, *demissa*, and *subplana*; near these, if not strictly united with them, is another group composed of *H. arborea*, *electrina*, *Ottonis*, and *indentata*. They are, in both cases, of a lenticular form, and remarkable for their smooth and glistening surface and delicate structure. They are closely allied in characters to the genus *Nanina*, and belong to Férussac's genus *Helicella*. The first group is mostly confined to the Southern and South-western States, while those of the second group are very widely distributed.

H. gularis, *lasmodon*, and *suppressa* compose another small group, similar to the preceding in form and in the polish of their surface, but peculiar on account of a curious lamination within the throat of the aperture. They are found only in the middle Atlantic States and the region of Tennessee.

H. alternata, *perspectiva*, *striatella*, and *cumberlandiana* form another group, remarkable for their discoidal form, broad umbilical concavity, and especially for their lyrate ribbed surface.

Helix ligera and *intertexta*, from the region of the Ohio River, are naturally allied to each other.

Thus we see that many of the groups formed by allied species are also quite local in their distribution, while

others prevail over a broad extent in every direction. These hints are sufficient to show the direction which should be given to our investigations, before we can come at the true history and natural classification of the snails.

For reasons already given, we would not attempt a definitive arrangement of our whole list on the ground of natural alliance. But as the number of species is such as to require some kind of systematic arrangement for convenience' sake, the divisions and subdivisions in the following table are adopted; although unfortunately, in several instances, it separates species from each other which are naturally allied. This arrangement supposes the shells to have arrived at maturity; and some little difficulty might arise, practically, to those not familiar with the differences which often exist between the young and adult shell, were these differences not pointed out. Immature shells always have a simple, sharp lip, with the epidermis a little in advance of the calcareous portion; they are always destitute of teeth or laminae in the aperture; many of them have an angular periphery, and an open umbilicus, in species where such an opening does not appear in the adult shell. As maturity comes on, the lip becomes thickened, in many species widely reflected, and then armed with teeth. An abundant callus is deposited, which in many instances covers over and closes the umbilical opening; and as the last whorl approaches the aperture it loses the angular character which distinctly marked the shell in its earlier stages.—[G.]

SECTION I. LIP REFLECTED.

Comprising all those species the margin of the aperture of whose shell is more or less reflected.

A. umbilicus wholly or partially covered.

Containing species in which the centre of the base of the mature shell is wholly or partially covered by the reflection of the lip, at its junction with the base.

a. Aperture destitute of tooth-like processes.

H. abjecta, albolabris, berlanderiana, buffoniana, californiensis, clausa, hortensis, major, multilineata, nickliniana, pennsylvanica, polychroa, tudiculata.

b. Aperture furnished with one or more tooth-like processes.

H. appressa, bucculenta, dentifera, edgariana, elevata, exoleta, germana, hirsuta, inflecta, loricata, maxillata, monodon, palliata, spinosa, thyroidus.

B. umbilicus not covered.

Containing species in which the centre of the base of the shell is never covered by the reflection of the lip, but in which the open space, or imaginary axis about which the whorls of the shell revolve, is more or less open and visible.

c. Aperture destitute of tooth-like processes.

H. columbiana, concava, labiosa, mobiliana, nuttalliana, pulchella, saxicola, townsendiana, vancouverensis.

d. Aperture furnished with one or more tooth-like processes.

H. auriculata, fallax, fatigiata, labyrinthica, leporina, profunda, pustula, sayi, septemvolva, texasiana, tridentata, vultuosa.

SECTION II. LIP SIMPLE.

Comprising all those species, the margin of the aperture of whose shell is not in any degree reflected, although it is sometimes a little thickened. The *aperture*, properly speaking, is never furnished with teeth, but in some of the species there are lamellar processes or prominent teeth *within* the aperture.

In the species belonging to this section, the terminating axis of the shell, about which the whorls revolve, being never covered with testaceous matter, the umbilicus may be said to be always open ; but it varies from a mere perforate point at the centre of the base of the shell, to an expanded cup-like cavity, exhibiting the inferior surface of all the volutions. The degree of separation differs considerably in the same species.

e. Aperture destitute of teeth or folds, within.

H. alternata, arborea, cellaria, chersina, cumberlandiana, demissa, egena, electrina, fuliginosa, indentata, inornata, intertexta, ligera, limatula, lucida, lucubrata, minuscula, ottonis, rotula, selenina, solitaria, sportella, striatella, strigosa, subplana.

f. Aperture having one or more teeth or folds, within.

H. gularis, interna, lasmodon, lineata, multidentata, perspectiva, suppressa.

SECTION I. LIP REFLECTED.

A. umbilicus covered, or nearly so,

a. Aperture destitute of tooth-like processes.

HELIX MAJOR, BINNEY.

PLATE I.

H. testâ orbiculato-globosâ, imperforatâ, luteo-corneâ vel sub-castaneâ ; striis elevatis, crebris, undatis ; anfractibus sex ; ultimo anfractu ventricosus ; aperturâ sub-rotundâ, contractâ, prope basin sub-unidentatâ ; labro albo, crasso, margine reflexo.

SYNONYMS AND REFERENCES.

Helix major, BINNEY. Bost. Jour. Nat. Hist., I. 473, pl. 12.

Helix albolabris, FÉRUSSAC. Hist., pl. 43, f. 4. 46 a, f. 7.

DESCRIPTION.

ANIMAL. Head, upper part of neck, and tentacles ferruginous ; eyes black ; foot rusty, the sides more or less shaded with blue by the fluids of the animal, which are visible through its semi-transparent substance. Tentacles short, in proportion to the size of the animal, and robust, their situation when retracted marked by brown lines. Foot large and thick. Genital orifice indicated by a slight prominence. Superficial glands large and distinct. On the centre of the back is a line of them, of an oblong narrow shape, with a furrow on each side ;

those on the sides and posterior part of the foot, when examined by a microscope, exhibit numerous sub-cutaneous white dots, or points, arranged in clusters. Length equalling twice the diameter of the shell.

SHELL. Convex, ventricose; epidermis uniform yellowish or brownish horn-color; whorls six, with numerous coarse, raised, parallel striæ, the body whorl very large and turgid; suture deeply marked; aperture rounded, contracted by the lip, and small in proportion to the size of the shell; lip white, thickened, reflected, inner margin near the base of the shell projecting, more or less prominent and tooth-like; umbilicus covered; base thickened with a testaceous callus in old specimens.

Greatest diameter one inch and three-quarters.

GEOGRAPHICAL DISTRIBUTION. This species is found in Tennessee, South Carolina, Georgia, Alabama, and Florida, and probably in other Southern States. It is common in hickory and oak woods, near streams in Florida.

REMARKS. This is the largest *Helix* hitherto discovered in the United States. It is not uncommon in cabinets, but has generally been considered to be a large variety of *Helix albolabris*, Say. This was probably Mr. Say's opinion, as the specimens figured by Férussac were received from him. Some acquaintance with the species in its native habitat, and comparison of a large number of specimens with *Helix albolabris*, have induced me to give it a place as a distinct species. It cannot be confounded with any other than that shell, and differs

from it in the following particulars : — It is much more globose, of a coarser and more solid texture, and the striæ of increase are much more raised and prominent, so much so, indeed, as to leave distinct grooves between them. The revolving striæ, so distinct on that shell, are either wanting or very indistinct. The aperture is smaller in proportion to the size of the shell, less flattened towards the plane of the base, and more rounded. The pillar lip and umbilicus are in many instances covered with a smooth and shining, semi-transparent, testaceous callus. The margin of the lip is thickened, the lip itself is narrower, less abruptly reflected, and not so much flattened, and there is often a tooth-like process on the inner and upper side of the margin near the umbilicus. The color of the epidermis is generally much darker. The only considerable variation in the characters of the shell is caused by the depression of the spire in some individuals, and indeed in all specimens from certain localities. In its most perfect condition it is often sub-conical. It is subject to some irregularities in the form of the mouth, and there is sometimes an indication of pale bands in the epidermis of the body whorl.

In those parts of the Eastern and Middle States where *Helix albolabris* abounds, it is in general but about half the size of this species, and is altogether a more delicate and beautiful shell. That this is not the same species, increased in size by the influence of a warmer climate, would seem to be proved by the fact that other species are not larger in Florida than in situations further north,

and that *Helix tridentata*, Say, common in every part of the country, is smaller in Florida than elsewhere. The color of the respective animals is widely different.

2. HELIX ALBOLABRIS, SAY.

PLATE II.

H. testâ orbiculato-convexâ, imperforatâ, luteo-corneâ, vel sub-castaneâ ; anfractibus transversè striatis, striis crebris, obliquis ; labro albo, expanso, margine late reflexo.

SYNONYMS AND REFERENCES.

Helix albolabris, SAY, Nich. Encyc. 181. pl. 1, f. 1.

Exped. St. Peter's Riv. II. 258.

American Conch. No. 2, pl. 13.

FÉRUSSAC, Tab. Syst. 36, No. 75. Hist. pl. 43, f. 1, 2, 3.

BINNEY, Bost. Jour. Nat. Hist. I. 475, pl. 13.

KIRTLAND, Report, 172.

DE KAY, New York Report, &c., 31.

SAGER, Michigan Catalogue, &c., 14.

GOULD, Invertebrata, &c., 170, pl. 101.

ADAMS, Mollusca, &c., 8. Am. Jour. XI. 272.

PFEIFFER, Monog. Helic. Viv. I. 290.

DESCRIPTION.

ANIMAL. Varying from pure white and cream color, through various shades of gray to blackish ; upper part of head and neck slightly brownish ; extremities of tentacles smoky ; eyes black. Superior tentacles more than half an inch in length when fully extended, slender, and cylindrical. Foot with a slightly expanded margin terminating posteriorly in an acute angle. Glandular

tubercles very distinct and prominent, on the back arranged longitudinally, on the tentacles long and narrow. Dental edge of the upper jaw saffron color.

Extreme length, two inches and a half.

SHELL convex; epidermis immaculate, of a uniform yellowish brown, russet, or light chestnut color; whorls between five and six, with fine parallel striæ running obliquely across them, and spirally striated with very minute and delicate, but distinct, wavy, impressed lines, which are most apparent on the back of the reflected lip; suture well marked and distinct; aperture contracted by the lip; lip white, flattened in the plane of the mouth, abruptly and very widely reflected; umbilicus of the mature shell covered by the reflected lip, which is continued to the base of the shell.

Greatest transverse diameter one inch and a half, ordinary size about one inch.

GEOGRAPHICAL DISTRIBUTION. This species has been noticed on the banks of the Missouri as high as Council Bluffs, and in the North-western Territory. It is found in all the States from Canada to South Carolina, in Tennessee and in Arkansas, and may be supposed to inhabit the whole extent of the United States except the most southern part, where it appears to be replaced by *Helix major*. It is more frequent in well wooded than in cleared sections, and is particularly abundant in the Middle and Western States, in tracts based on the limestone formation.

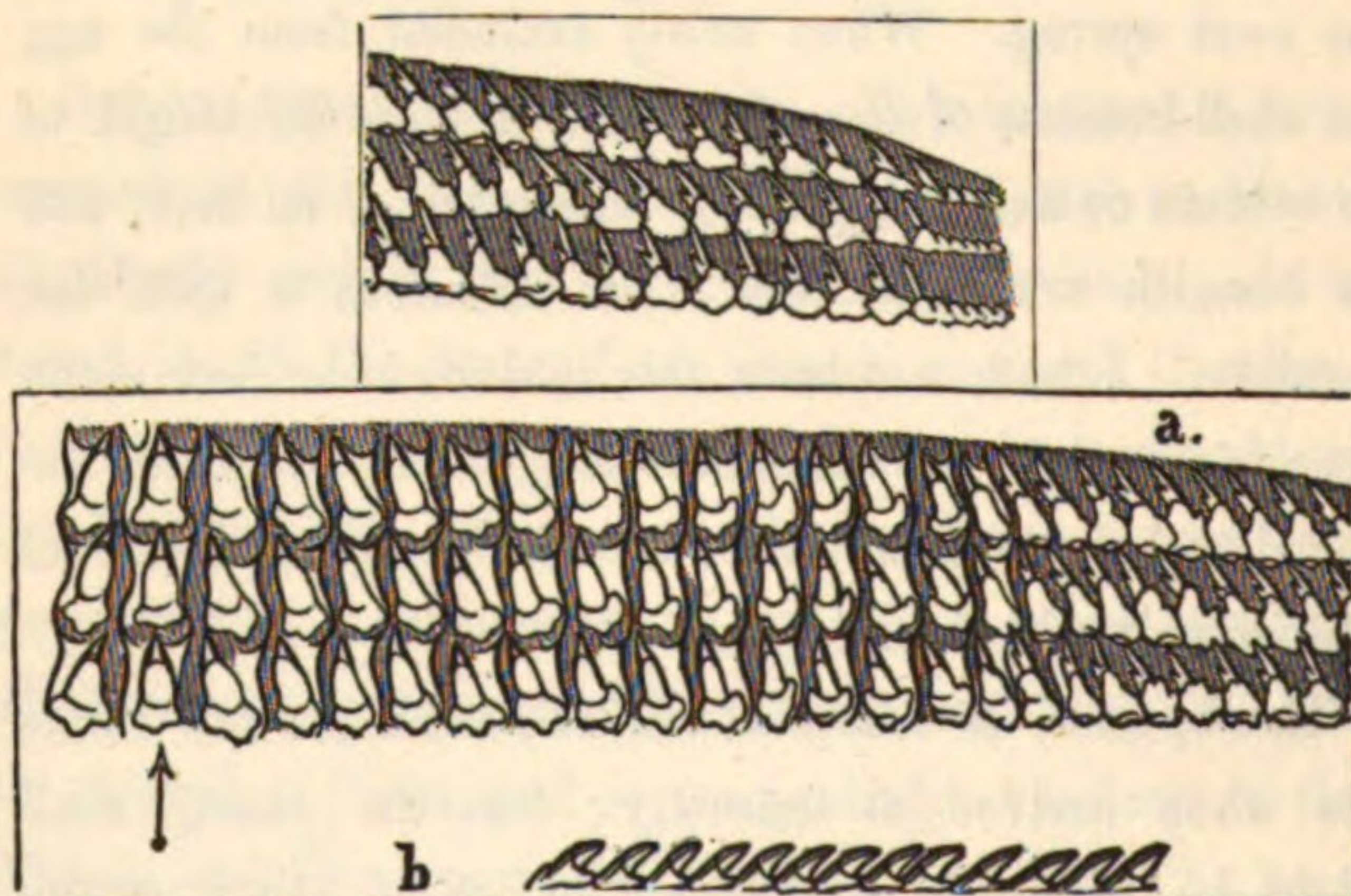
REMARKS. Although inhabiting a geographical range of great extent, it is very uniform in its characters, individuals from the most distant localities not exhibiting any considerable differences; but western specimens are usually darker, heavier, and thicker than those from the North-eastern States. Destitute of brilliant tints and markings, it is still a beautiful species, and will always attract attention in a collection by its delicately striated surface, its broad white lip, its pleasing though modest color, and its elegant contour.

The animal deposits about fifty eggs at each laying, which is repeated one or more times during the season. The eggs are three-sixteenths of an inch in their greatest diameter, and covered with minute points. The last laying is often delayed to so late a period of the year that the earth is covered with snow before they are hatched. The development of the embryo is then suspended until the next spring. When newly excluded from the egg the shell consists of one whorl and a half, the length of its column or axis being about one-eighth of an inch, and its breadth somewhat less. No umbilicus is then discernible. I have not been able to determine how much time is required to complete its growth, but I am induced to believe that the reflected lip, the evidence of maturity, is added in the second year.

This species, as before remarked, offers but few varieties when arrived at maturity; but the young shell might be taken for a distinct species, it being umbilicated, and destitute of the reflected lip. It is not until

the shell has attained its full size that the reflected lip is added, and the umbilicus is covered. It resembles *Helix thyroidus*, *Helix exoleta*, and *Helix major*, but is distinguished from the former by its greater size, covered umbilicus, and want of the tooth-like process on the pillar lip, and from *H. exoleta* by the absence of the tooth, and its less ventricose form. The differences between it and *H. major* are pointed out in the remarks on that species.

Lister's figure, (tab. 47, f. 45,) referred to by Férussac and others as representing this shell, is very unlike it. The spire is too much produced, and the last whorl too voluminous. It would not have been conjectured to be this species, were it not that the locality is indicated by the word *virginiana* engraved upon the plate.



3. HELIX MULTILINEATA, SAY.

PLATE III.

H. testâ orbiculato-convexâ, imperforatâ, luteo-corneâ, lineis fuscis diversissimè fasciatâ ; anfractibus elegantissimè striatis ; striis confertis ; peristomate albo, margine reflexo.

SYNONYMS AND REFERENCES.

Helix multilineata, SAY, Jour. Acad. II. 150.

FÉRUSSAC, Hist. pl. 46, a. f. 3.

BINNEY, Bost. Jour. I. 480, pl. 14.

KIRTLAND, Ohio Report, &c., 173, 199.

SAGER, Michigan Catalogue, 14.

DESCRIPTION.

ANIMAL. Blackish, granulated ; granules, whitish with darker interstices ; foot, beneath black.

SHELL. Rounded, convex, rather thin ; epidermis yellowish-brown, or russet color, with numerous reddish brown, finely undulated, revolving lines and bands ; whorls, between five and six, with delicate, parallel, oblique striæ ; suture distinctly marked ; aperture lunated, slightly contracted by the lip ; lip white, not much expanded, reflected, rather thin ; umbilical region impressed.

Greatest transverse diameter, three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. "An exceedingly numerous species in the moist forests on the margin of the

Mississippi River, near the Ohio," according to Mr. Say. It is also common in the States bordering upon the Ohio River, but has not been noticed east of the Alleghany mountains.

REMARKS. This is a beautiful species, distinguished by its shining epidermis, its crowded and delicate raised striæ, and the numerous reddish-brown revolving lines, which contrast well with the russet or yellowish ground on which they are traced. The lines vary in number from three or four to thirty or more, and are sometimes united into bands. On the sides and base they are usually finely undulated. The general contour of the shell resembles that of *Helix thyroïdus*. It is in general thinner and more fragile than other shells found in the same region, and varies very much in size; individuals with the mature lip occur, not exceeding half an inch in diameter. It is occasionally entirely destitute of lines and bands, and in one or two instances I have noticed the epidermis of the living shell to be white.

It would appear from the statement made by Dr. Kirtland that their habits are somewhat peculiar. "Wet marshes are its principal resort, where, during summer, it may be seen climbing about on weeds and blades of grass, apparently endeavoring to avoid the water collected beneath it. At the approach of winter it retreats to the tops of the carex-bogs, where several dozen may be found collected together in a torpid state, with the mouths of their shells closed with an epiphragm. They usually form a shallow excavation on the bog, concealed

beneath the tufts of dead grass." The numbers collected in these retreats are sometimes "agglutinated into one mass." This habit of attaching themselves to each other in numbers, during their hybernation, I have not witnessed in any other of our species, but I believe it is common in some European species.

4. HELIX PENNSYLVANICA, GREEN.

PLATE VII.

H. testâ elevato-convexâ, imperforatâ, corneo-rufescente ; anfractibus tenuiter striatis, striis obliquis, confertis ; spirâ elevatâ, apice obtuso ; aperturâ sub-triangulari ; labro albo, margine reflexo ; regione umbilicali depressâ.

SYNONYMS AND REFERENCES.

Helix Pennsylvanica, GREEN, Contributions, No. 1, p. 8.

KIRTLAND, Ohio Report, 173.

BINNEY, Boston Jour. Nat. Hist. I. 483, pl. 16.

PFEIFFER, Symbolæ, II. 36.

Monog. Helic. Viv. I. 291.

DESCRIPTION.

ANIMAL. Upper surface of a dull, uniform lead-color, lower surface of the foot lighter ; about twice as long as the transverse diameter of the shell.

SHELL. Convex, elevated ; epidermis yellowish horn color, or russet ; whorls six, convex, with crowded, elevated, oblique striæ ; suture distinctly marked ; aperture sub-triangular, contracted by the lip ; lip white, narrow,

reflected, not flattened, with sometimes a slight thickening on the inner side near the base ; umbilical region indented.

Extreme transverse diameter, three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Ohio, and the western part of Pennsylvania, and may probably be found in all the States bordering on the Ohio river.

REMARKS. A very well marked species, distinguished chiefly by its triangular mouth and elevated spire. The volutions are usually about six, rounded, or convex. The shell is rather thin, and the lip but narrowly reflected. Some individuals resemble *H. elevata*, Say, as is mentioned in the remarks on that species. The color of all the thinner shells of this genus appears darker when the animal is retracted into the shell, and this species has then, sometimes, a purplish tinge. The shell varies in being more or less elevated ; in some individuals the spire is much flattened. It differs greatly in size also, some perfect shells not attaining more than one half the size of others. Some persons have thought that *H. clausa*, Say, is a small variety of this shell ; but the rounded aperture, which is a constant character in that shell, precludes that supposition. The specimen figured in the plate is a rather large one.

The animal of this, and many other species, is often overrun with great numbers of Acari, resembling *Acarus limacum* of Europe. There appears to be at least two species of them. They are very minute, flesh colored,

and move with great rapidity, often entering and coming out of the respiratory foramen. Their presence does not seem to cause any uneasiness, nor even to be felt by the snail.¹

5. HELIX CLAUSA.

PLATE IV.

H. testâ sub-globosâ, sub-imperforatâ, luteo-corneâ ; anfractibus striatis, striis minutis, crebris ; aperturâ rotundatâ ; peristomate albo, margine reflexo.

SYNONYMS AND REFERENCES.

Helix clausa, SAY, Jour. Acad. II. 154.

American Conch. No. 4. pl. 37, f. 1.

BINNEY, Boston Jour. Nat. Hist. I. 482, pl. 15.

KIRTLAND, Ohio Report, 172.

SAGER, Michigan Catalogue, 14.

DE KAY, New York Report, 31.

Helix Mitchelliana, Lea, Am. Phil. Trans. vi. 87, pl. 23, f. 71.

Helix Mitchella, Kirtland, loc. cit. 173.

DESCRIPTION.

ANIMAL. Blackish.

SHELL. Rounded, or somewhat globular ; epidermis light yellowish brown or russet color ; suture distinct ;

¹ *Hypopus concolor*, HALDEMAN. Oval, nearly colorless or very pale ochraceous ; bristled ; sides impressed. Length, 0.4 millim.

Differs in outline from the European species, which it resembles in general appearance, mode of life, and in the large pair of projecting setæ anteriorly and posteriorly. A colored dorsal line has been observed.



whorls five, with delicate raised, oblique striæ; aperture rounded, upright, its plane making an acute angle with the axis of the shell, somewhat contracted by the lip; lip white, reflected; base rounded; umbilicus nearly covered by the reflected lip.

Greatest transverse diameter five-eighths of an inch; ordinary size about half an inch.

GEOGRAPHICAL DISTRIBUTION. Occurs plentifully in the Western and Southwestern States, and in the States bordering upon Lake Erie. It has not hitherto been noticed in the Eastern States.

REMARKS. This is a well marked and beautiful species. Its form is quite globular, especially in small individuals. Its surface is shining, and its striæ of increase delicate and regular. Its aperture is rounded and the lip reflected but not flattened. The umbilicus in specimens entirely mature is covered, but, as commonly seen, a small opening still remains. Its extreme diameter never exceeds three-fourths of an inch, and sometimes does not attain half that size. In the larger specimens the spire is less elevated in proportion to the other dimensions. The whorls are well rounded and do not exceed five. It may be confounded with small specimens of *H. pennsylvanica*, and of *H. thyroidus* in their immature condition, but the former can be detected by its sub-triangular aperture, and the latter, when closely examined, by the rudiments of the tooth, exhibited by a slight thickening in its place, resembling the touch of a pencil of varnish,

over the epidermis. From young specimens of *H. bucculenta*, which it resembles still more nearly, it may be distinguished by the same marks.

I formerly supposed this to be a doubtful species, but it was at a time when but few specimens had been procured, and when it was almost unknown in collections in this neighborhood. I now esteem it to be as well established as any other species.

I have examined Mr. Lea's original specimen of *H. mitchelliana*, and entertain no doubt of its specific identity with the present species. The lower outline figure represents that shell.

The history of this species affords an instance of the disregard of European naturalists to Mr. Say. The first description was published by him in January, 1821, under the name of *Helix clausa*; yet a year afterwards, M. Férussac applied the same name to another American species, which had also been described by Mr. Say as *Helix inflecta*. Both of Mr. Say's descriptions are contained in a well known Journal accessible to, and quoted by them; but notwithstanding this, the error committed by M. Férussac has been perpetuated by M. Deshayes and others, down to the present time.

6. HELIX BERLANDERIANA, MORICAND.

PLATE XLIX. FIGURES 1, 2.

H. testâ sub-globosâ, arctè perforatâ, lucidâ, sub-opalinâ, pallidâ, vix striatâ; anfractibus quinque convexis, suturâ

benè discretis ; aperturâ constrictâ, lunatâ, peristomate albo, reflexo, intus incrassato.

SYNONYMS AND REFERENCES.

H. Berlanderiana, MORICAND, Mem. de Genève, VI. 537, tab. 1. fig. 1.

LAMARCK, An. sans Vert. (Desh. ed.) VIII. 133.

PFEIFFER, Monog. Helic. Viv. I. 165, No. 425.

DESCRIPTION.

ANIMAL quite transparent, yellowish white, immaculate ; tentacles darker, with a dark line running back from them quite under the shell ; eyes black.

SHELL rather small, depressed globose, thin and translucent, scarcely striated, shining and with a somewhat silken or opaline lustre, pale yellowish green, sometimes nearly colorless, and generally having a faint, narrow, brownish band around the posterior third of the last whorl. Spire consisting of five well rounded whorls, separated by a deeply impressed suture, the last whorl broadly rounded at the periphery ; contracted at the aperture, which is small crescentic, with a white, polished, roundly reflexed peristome, presenting a sharp, inner edge to the interior. The peristome is somewhat angular near its posterior junction, and at this part the shell is thickened within with callus, and is opaque white. Base rounded, and perforated by a minute umbilicus.

Diameter half an inch ; altitude variable, on an average one-fourth less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the south-

western region beyond the Mississippi, and was found quite abundant at Corpus Christi, in Texas, and at the Washita Springs, in Arkansas.

REMARKS. The aspect of this shell is quite different from that of any other North American species except *H. mobiliana*, which is a much smaller shell. Small specimens of *H. clausa* approach large specimens of this shell somewhat. *H. similaris* is also allied in its characters. I am inclined to think that *H. pachyloma*, Menke, is one of the forms of this variable species. [G.]

7. HELIX HORTENSIS, MÜLLER.

PLATE VIII.

H. testâ sub-globosâ, imperforatâ, glabrâ, luteâ, unicolore vel fasciatâ ; anfractibus quinis, ultimo anfractu ventricosus ; labro albo, sub-reflexo, intus incrassato ; basi convexo.

SYNONYMS AND REFERENCES.

Helix hortensis, MÜLLER, loc. cit. 52, No. 247.

GOULD, Invertebrata, &c. 172.

Helix sub-globosa, BINNEY, Boston Jour. Nat. Hist. I. 485. pl. 17.

DESCRIPTION.

ANIMAL. Head and neck blackish, with a slight tinge of brown ; tentacles smoky ; eyes black ; base of foot inky, posterior extremity dirty flesh-color. Foot rather slender, terminating acutely. Respiratory foramen surrounded with a blackish circle. Genital orifice indicated

by a blackish spot a little behind the large tentacle of the right side. Length about twice the breadth of the shell.

SHELL, sub-globose; epidermis shining, smooth, olivaceous-yellow, very rarely with rufous horizontal bands or lines; whorls five, convex; spire somewhat elevated; suture, at the extremity of the last whorl, curved towards the aperture; lip slightly reflected, white, obsolete on the base, with the margin thickened internally; aperture rounded, slightly contracted at the base by the thickening and indentation of the lip; umbilicus covered, indented; base convex.

Greatest transverse diameter three-quarters of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the eastern part of Massachusetts, near the sea. Is common on the lower parts of Cape Cod, and on Cape Ann, and is very abundant on Salt Island, a rocky, uninhabited islet near Gloucester. It is also said to occur in the northern part of Vermont, in Maine, Canada on the St. Lawrence, Nova Scotia, and the islands of St. Pierre and Miquelon.

REMARKS. This species was formerly described by me as *Helix sub-globosa*, from the belief that its distinctive characters were so strongly marked as to separate it from *Helix hortensis* of Europe. I am now convinced of its identity with the latter species, and believe its origin, in this country, to be due to the constant commercial inter-

course with those parts of Europe where it abounds. It is yet found only in restricted localities, and chiefly near the sea-shore, but being acclimated it may probably become more generally diffused.

It may be distinguished from the foreign varieties, by its general aspect, its uniformity of coloring, the greater prominence of the spire, the difference in the color of the animal, which Draparnaud describes as "commonly pale, or a little grayish, or slightly reddish;" a description that could not be applied to the variety in question; and lastly by its epiphragm, which is a thin transparent membranous pellicle, as in one other species, in place of an opaque papyraceous one, as stated by that author.

In the young shell, the umbilicus, which is at length hardly large enough to admit the point of a pin, is open, and the lip is simple.

Its habits seem to differ, in some degree, from those of our indigenous species. Unlike them, it does not appear to burrow under stones, or decaying wood and leaves, but is found on the surface of the ground, or ascending the stems, and adhering to the leaves of the shrubs which cover the soil. I have thought, too, that in captivity it is less disturbed by the want of moisture than any of our native species.

Having kept a large number of this species in confinement, I have frequently had an opportunity of noticing the manner in which the epiphragm is formed, a process which seems not to have been heretofore correctly

described. The aperture of the shell being upwards, and the collar of the animal having been brought to a level with it, a quantity of gelatinous matter is thrown out, which covers it. The pulmonary orifice is then opened, and a portion of the air within suddenly ejected, with such force as to separate the viscid matter from the collar and to project it, like a bubble of air, from the aperture. The animal then quickly withdraws further into the shell, and the pressure of the external air forces back the vesicle to a level with the aperture, when it hardens and forms the epiphragm. In some of the European species in which the gelatinous secretion contains more carbonate of lime than ours, solidification seems to take place at the moment when the air is expelled, and the epiphragm in these is strongly convex.

The prevalent characters of this, and probably of other species in a given locality, seem to undergo a considerable change from time to time. When I first visited Salt Island, where this species abounds, ten years ago, it was impossible to find a single specimen with either lines or bands. One uniform color prevailed throughout. At the present time, the banded varieties are said not to be uncommon. [They have recently been discovered by Dr. Samuel Cabot, in great numbers, on House Island, another of the little islets in the vicinity of Cape Ann, where all of them are of the banded variety. On the Outer Gooseberry, another neighboring islet, he found still another variety.—G.]

8. HELIX BUFFONIANA, PFEIFFER.

PLATE XLIII.

H. testâ ventricosâ, sub-imperforatâ, griseo-albidâ, granulosa, fasciis tribus rufis cinctâ; apice sub-acuto; anfractibus quatuor, anfractu ultimo permagno; aperturâ obliquâ, amplâ; labro sub-reflexo.

SYNONYMS AND REFERENCES.

H. buffoniana, PFEIF., Menke's Zeitsch. für Malacozool. Oct. 1845, p. 152.

Symb. Heliceor. III. No. 473.

Monog. Heliceor. I. 196.

PHILIPPI, Abbild. &c. Helix, p. 47. tab. IX. fig. 2.

DESCRIPTION.

ANIMAL. Not noticed.

SHELL. Ventricose, grayish white, spire acuminate; whorls four, rapidly enlarging in diameter from the apex to the aperture, last whorl very ample, with rough irregular striæ and wrinkles: aperture oblique, large; lip narrow, white, sub-reflected; umbilicus only partially covered by the reflection of the lip as it rises from the base: base turgid, a thin testaceous deposit connecting the two extremes of the lip; surface of the shell shagreened or covered with minute rough granulations; three rufous bands revolve upon the whorls, only partly visible on the spire.

Greatest transverse diameter, one inch and a half.

GEOGRAPHICAL DISTRIBUTION. Inhabits Mexico, in some parts of which it is abundant.

REMARKS. [This shell has a general resemblance in form and coloring to *H. aspersa* of Europe, for which it was unfortunately mistaken by the author, and is erroneously so lettered on the plate. It is of larger size, and an examination of its surface, which is singularly granulated, can leave no doubt of its distinctness.—G.]

9. *HELIX ASPERSA*, MÜLL.

H. testâ imperforatâ, conico-globosâ, rugulosâ, griseo-lutescente, fasciis variis castaneis flammulisque flavidis ornatâ: anfractibus quatuor convexiusculis, ultimo ventricosos; aperturâ lunato-rotundatâ, peristomate acuto, expanso, albo, margine columellari dilatato.

SYNONYMS AND REFERENCES.

Helix aspersa, MÜLL., Verm. II. 59. No. 253.

FÉRUSSAC, Hist. tab. 18, 19, 21, B. 24.

LAM. An. sans Vert. (Desh. ed.) VIII. 32.

DESCRIPTION.

SHELL. Sub-globose, imperforate, rather thin, the surface rather coarsely and irregularly striate, and finely wrinkled and indented; the ground color is yellowish or grayish, with chestnut-colored bands of various width, across which are narrow undulating flammules of yellowish. The spire is rather obtuse, composed of four or five moderately convex whorls, the principal one being very large and ventricose. The aperture is large, a little oblique, rounded lunate; the lip white, sharp,

turned slightly outward, and in the region of the umbilicus turning over the columella in a broad appressed callus, which is continued to the upper junction of the lip.

Greatest diameter, about one inch and a quarter.

GEOGRAPHICAL DISTRIBUTION. It has been found at New Orleans, Charleston, S. C., Nova Scotia, and also on the coast of Maine.

REMARKS. This well known species, so common in every part of Europe, is among those which commerce has introduced to this country. Wherever it has hitherto been found, it could be traced directly to the Old World. It is known to have been brought from Spain to New Orleans in captivity, as an article of food. It is a large species, more ventricose than any of our large ones, and is readily recognized by its peculiar bands, intersected by yellow flames and stripes. It may be distinguished from *H. buffoniana*, which it otherwise closely resembles, by the want of granules upon its surface, and its bands are much more distinctly defined.

10. HELIX TUDICULATA, BINNEY.

PLATE XVI.

H. testâ orbiculato-convexâ, imperforatâ, rufo-olivaceâ, fasciâ unicâ castaneâ cinctâ, et impressionibus squamoidis undique signatâ; aperturâ transversâ; labro albido, sub-reflexo; basi convexâ.

SYNONYMS AND REFERENCES.

Helix tudiculata, BINNEY, Bost. J. N. H. IV. 360. pl. 20.

PFEIF., Monog. Helic. Viv. I. 363.

DESCRIPTION.

ANIMAL. Not observed.

SHELL. Orbiculate-convex; epidermis olivaceous; spire a depressed cone; whorls between five and six, slightly convex; body-whorl voluminous, expanding somewhat towards the aperture: aperture transverse, rather circular: lip whitish, slightly reflected; umbilicus covered by a testaceous collar uniting with the reflected lip; base convex; a well-defined, rather wide, dark chestnut band, margined with a light color above and below, revolves near the centre of the body whorl, and is more or less visible above the suture on the two whorls preceding the last; surface of the outer whorl covered with somewhat regular impressions or indentations with ridges between, causing it to look as if covered with scales; when these are not apparent, it is marked with oblique wrinkles.

Transverse diameter one inch and a quarter.

GEOGRAPHICAL DISTRIBUTION. The only individual I have seen, belonging to the cabinet of Andrew Belknap, Esq., was taken near St. Diego, California.

REMARKS. This beautiful and well defined species is unlike any shell which I have, and no description has been met with which corresponds to it. It resembles in its general appearance *Helix Dupetithouarsii* of Deshayes (*Guerin, Mag. de Zoöl.* 1841, pl. 30,) but it is

destitute of an umbilical opening, which in that species is large. The singular indentations of the surface resemble the indentations of the hammer on the interior of silver vessels, and hence the specific name. In this respect it resembles *H. townsendiana*, Lea, from the same region, which however has a large umbilicus, a widely reflected lip, and a more robust form, like *H. exoleta*.

11. HELIX NICKLINIANA, LEA

PLATE VI. FIGURE 1. PLATE VI. a.

H. testâ conico-globosâ, vix perforatâ, tenui, leviter striatâ, concinnè indentatâ et granulatâ, dilutè corneâ, rufo-zonatâ; spirâ elevatâ, anfractibus sex convexis, ultimo ventricoso; aperturâ rotundatâ, labro reflexo, albo.

SYNONYMS AND REFERENCES.

Helix Nickliniana, LEA, Trans. Amer. Philos. Soc. VI. 100., pl. 23. f. 84.

DESCRIPTION.

ANIMAL. Not observed.

SHELL conic-globose, rather thin, the surface lightly marked by the lines of growth, faintly indented and delicately shagreened with fine microscopic granules arranged in quincunx. It is pale horn-color or sometimes cinereous, girdled with a single narrow chestnut brown zone, paler at its edges; the whole covered with a thin, yellowish-brown epidermis. Spire elevated, whorls six, moderately convex, the outer one ventricose, with some approach to an angular periphery. Base tumid,

depressed at centre and perforated by a very small umbilicus. Aperture rounded, forming two-thirds of a circle; lip white, slightly reflected above, more so below, until at the umbilicus it is quite revolute and mostly covers the opening. Within, flesh color.

Diameter seven-eighths of an inch; axis three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Mr. Lea's specimens were brought from California. Others were obtained by the Exploring Expedition along the Sacramento River.

REMARKS. The general aspect of this species in form and coloration is much like that of *H. arbustorum*. The shell is thinner, somewhat more conical, and the aperture larger, with the lip less reflected. It belongs to the same group with *H. tudiculata*, and has the same general marking; but it is smaller and more elevated. The coloration varies in being more or less clear brown or flecked with ash color. There is also considerable variation in solidity. One specimen deviates so much in these respects and others, that there would be no hesitation in regarding it as a distinct species, were it seen unaccompanied by others. It is quite solid, grayish, with a band scarcely perceptible. The striae of growth crowded and beautifully decussated by revolving impressed lines which deviate as they pass over the larger longitudinal ridges. The peristome is much thickened within, so as greatly to contract the aperture. It is represented by the middle figure of Plate VI.

12. HELIX CALIFORNIENSIS, LEA.

PLATE VI. FIGURE 2.

H. testâ globoso-conicâ, vix perforatâ, tenui, lucidâ, subtilissimè indentatâ et granulatâ, luteo-corneâ fasciâ rufâ cinctâ ; spirâ elevatâ, anfractibus quinis, ultimo vesiculoso ; aperturâ semicirculari, labro reflexiusculo, intus incrassato, albo.

SYNONYMS AND REFERENCES.

Helix Californiensis, LEA, Trans. Amer. Philos. Soc. VI. 99, pl. 23, f. 79.

DESCRIPTION.

ANIMAL. Not observed.

SHELL, ventricose, sub-globular, thin and transparent, shining, delicately indented and granulated, faintly but regularly striate, of a pale yellowish horn-color, minutely flecked with pale spots and girded by a narrow brown band, paler at its edges. Spire elevated, whorls five, convexly rounded, the last very broad, vesicular ; base ventricose. Aperture rather small, sub-circular, the lip slightly everted, thickened within, more everted towards its inner junction, where it is roundly reflected nearly covering a very small umbilical perforation. The interior has a silky lustre.

Diameter six-eighths, axis five-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. Brought by Mr. Nuttall from San Diego, Upper California.

REMARKS. This species is closely allied to the preceding by its general contour, coloring, and marking, and

might be regarded, at first sight, as a young, or starved specimen of it. It is much more delicate, and generally much smaller. Its form is much more globose, approaching, in the form of the large whorl, to *H. aperta*; and the brown band is more clearly edged with yellow.—[G.]

13. *HELIX ABJECTA*, GOULD.

PLATE XIII. a. FIGURE 2.

H. testâ imperforatâ, orbiculari-depressâ, corneâ, liris obliquis porcatâ; spirâ depressâ, anfractibus quinis convexiusculis, ultimo subangulato; basi convexâ, ad centrum impresso et callo albo obtectâ; aperturâ rotundato-lunari, labro albo, flexuoso, valdè reflexo, posticè instricto.

SYNONYMS AND REFERENCES.

H. abjecta, GOULD, Proc. Bost. Soc. Nat. Hist. III. 40, Oct. 1848.

DESCRIPTION.

ANIMAL. Not observed.

SHELL, rather small, depressed, somewhat discoidal, of medium thickness and a dingy horn-color, sculptured with coarse oblique furrows. Spire slightly convex, whorls about six, a little convex, and separated by a well impressed suture; the outer whorl is a little angular at its periphery. Beneath, it is more smooth, moderately convex, with the central region excavated, and covered with a glazing of white callus. The aperture is lunate, and very oblique; the lip is white, broadly reflected, its basal portion horizontal, and its outer portion flexuous.

Diameter three-fourths of an inch ; axis three-tenths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Arkansas, in the region of the Washita Springs.

REMARKS. Its general aspect is that of *H. appressa*. On a closer examination it is found to be thinner, more coarsely ridged, and a little more globular. The aperture is larger, more rounded, and destitute of a tooth ; the lip is peculiarly flexuous. The umbilical region is the same. *H. dentifera* is still more like this in form, but it has also a tooth, and its surface is minutely granulated by fine decussating lines. *H. columbiana* is much more globular, smooth, with the umbilicus open, and also with a sinus to the lip.—[G.]

14. HELIX POLYCHROA, BINNEY.

PLATE XLVI, XLVII.

H. testâ solidulâ, arctè perforatâ, globoso-conicâ, striat-ulâ, lævi, versicolore, albâ, fuscescente, virescente, vel rubescente, unicolore vel fasciis variis nigricantibus cinctâ ; apice et labiis semper rosaceis ; spirâ elevatâ, anfractibus 5-6 convexis ; basi convexiusculâ ; aperturâ parvâ, sub-circulari, peristomate acuto, reflexiusculo, intus incrassato, portione columellari dilatato, planulato ; fauce plerumque rosaceo.

SYNONYMS AND REFERENCES.

Helix submeris, MIGHELS, Proc. Bost. Soc. Nat. Hist. I. 187.

DESCRIPTION.

ANIMAL. Body of a delicate white color, very finely granulated, upper tentacles rather long; a dark line arising between the tentacles and along the back passes under the shell; a fainter line is found along each side of the neck.

SHELL of medium size, solid, conic-globose, delicately striate, but leaving the surface smooth and shining. The ground color is variable, being white, dusky, greenish or reddish, and either plain or variously encircled by dark bands; the tip and the lip, especially the columellar portion, is always rose red, and generally, likewise, the throat. The spire is elevated, composed of about five and a half convex whorls, the outermost broadly rounded at the periphery. The base is moderately convex and perforated by a minute umbilicus, nearly covered by the expanded and flattened pillar lip. Aperture small, approaching two-thirds of a circle, the peristome acute, thickened within, a little everted, becoming more so towards its inner junction. Among the varieties the following may be enumerated:

α . elevated, white with a median black band on the outer whorl, which is sutural on the spire margined with pale citron.

β . the same, with two approximate black basal bands.

γ . elevated, white with two narrow bands on the outer

whorl, one of which is median, the other sutural on the spire, the latter interrupted.

δ. the same, with a broad basal fascia.

ε. yellowish, with numerous bands partially blended by dusky lines in the direction of the increment.

ζ. fuliginous, with a single white peripheral fascia and white umbilical area. (This variety was described by Dr. Mighels under the name of *H. submeris*.)

η. depressed, ashy-olive, with a white peripheral band.

θ. elevated, uniform yellowish green.

ι. uniform pale reddish.

Diameter seven-tenths of an inch ; axis five to six-tenths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Florida. It was found by Mr. Bartlett near the beach at Cape Florida and Key Biscayne, under dead leaves among palmetto and sea-grape trees ; at Key West by Capt. Walden.

REMARKS. This is the only shell among all our North American Helices which has the aspect of a decidedly tropical species, and there is more reason to suppose that it has been derived from some of the neighboring West India Islands, than that it is indigenous, though we do not yet know of its having been found elsewhere. With the exception of *H. alternata*, or *H. Cumberlandica*, it is the only species which has any thing like variegated coloring. Although it approaches closely to several described species, and especially to *H. versicolor*,

Born, and *H. carnicolor*, Menke, yet we feel compelled to regard it as similar and not identical, a member of a group such as is usually found in particular geographical regions. It is doubtless the shell alluded to by Mr. Forbes, in his catalogue of species common to both sides of the Atlantic, as *H. Pisana*, which it greatly resembles, especially in the color of the aperture. A comparison of the base and other characters will show their difference. It cannot be confounded with any other North American species.—[G.]

b. Aperture toothed.

15. HELIX ELEVATA, SAY.

PLATE IV.

H. testâ orbiculato-conoideâ, imperforatâ, luteo-corneâ ; spirâ elevatâ ; anfractibus tenuiter striatis, striis obliquis ; aperturâ sub-angulatâ ; labro albo, parte inferiori internè sub-dentato, margine reflexo ; columellâ dente robusto, albo, sub-arcuato armatâ.

SYNONYMS AND REFERENCES.

- Helix elevata*, SAY, Journ. Acad. II. 154, anno 1821.
 American Conchology, No. 4. pl. 37, f. 2.
 KIRTLAND, Ohio Report, 173.
 SAGER, Michigan Catalogue, 14.
 BINNEY, Boston Jour. Nat. Hist. I. 490, pl. 19.
 DEKAY, New York Report, 31.
Helix Knoxvilleana, FÉRUSSAC, Tab. Syst. 37, No. 94.
 Hist. pl. 49, f. 5, 6.
Helix Tennesseeensis, LEA. Trans. Am. Phil. Soc. N. S. VI. (young.)

DESCRIPTION.

ANIMAL. Ashy brown on the upper surface, lighter on the posterior extremity and sides; collar grayish-white; glands prominent and distinct.

SHELL. Very convex, elevated, almost conical; epidermis yellowish horn-color; whorls nearly seven, rounded, with fine oblique transverse striæ; suture distinct; aperture contracted by the lip, somewhat triangular; lip white, reflected, lower inner margin a little thickened; pillar-lip with a large, white, robust, obliquely-curved tooth; umbilicus covered.

Greatest transverse breadth seven-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northern States, from New York to Missouri, the western parts of Pennsylvania and Virginia, East Tennessee, and the States bordering upon the Ohio River. It is very abundant in the neighborhood of Cincinnati.

REMARKS. This is a rather thick and heavy shell. It resembles *H. Pennsylvanica* in general aspect, but is larger, has one more whorl, and is a coarser shell. The tooth on the pillar lip, which is wanting in the other, will always enable one to distinguish the mature shells; but the young resemble each other so nearly that it is difficult to discover a difference. The variations of the species are small, the greater or less elevation of the spire being the common cause of the differences.

In captivity, it burrows much under the surface of the

ground, and keeps itself hidden the greater part of the time.

The first description of this shell was published by Mr. Say, in the Journal of the Academy of Natural Sciences of Philadelphia, in January, 1821. Early in 1822, it was indicated by Férussac in his *Tableau Systematique*, as *H. Knoxvillina*, as was afterwards shown, when the explanation of the supplementary plates of his work was published, in which the figure of this species is referred to as *H. Knoxvillina* of his *Tableau*, and as *H. elevata* of SAY. Mr. Say's *description* having been published a year before the *name* of Férussac, which was unaccompanied with specific characters to enable the reader to identify it, should give the name first imposed the precedence, and I therefore retain it. M. D'Orbigny, in his *Synopsis* of the land and fresh water shells of South America, published in Guérin's *Magasin de Zoölogie* for 1835, has applied the same name to one of the species described by him. He was doubtless ignorant that it had been pre-occupied, and will of course replace it by another, when the fact is known to him. On careful comparison of specimens of Mr. Lea's *H. Tennesseënsis* with the inner whorls of this species, there can be little doubt that it is the same shell in an immature state.

16. **HELIX THYROIDUS, SAY.**

PLATE XI.

H. testâ orbiculato-convexâ, sub-umbilicatâ, luteo-corneâ ; anfractibus tenuiter striatis, striis confertis, obliquis ; appendiculo dentiformi, obliquo, columellæ adnato ; peristomate albo, margine reflexo.

SYNONYMS AND REFERENCES.

- Helix thyroidus*, SAY, Nich. Encyc. (Amer. ed.) IV.
 Journ. Acad. I. 123, II. 161.
 American Conchology, No. 2, pl. 13.
 FÉRUSAC, Hist. pl. 49, a. f. 4 ; pl. 50, a. f. 6. ?
 DESHAYES, Encyc. Meth. II. 230.
 LAMARCK, An. sans Vert. 2 ed. VIII. 114.
 SAGER, Michigan Catalogue, 14.
 BINNEY, Bost. Jour. Nat. Hist. I. 488, pl. 18.
 DE KAY, New York Report, 31.
 GOULD, Invertebrata, &c., 171, pl. 108.
 ADAMS, Mollusca, &c., 9.
Helix thyroides, PFEIFFER, Monog. Helic. Viv. I. 356.

DESCRIPTION.

ANIMAL. Color a dirty yellowish white, with a grayish hue in some individuals, tentacles darker, eyes black, base of foot dirty white ; foot rather narrow, terminated posteriorly in an acute angle. Length equal to twice the breadth of the shell.

SHELL rounded, convex ; epidermis, of a uniform yellowish brown or russet color ; whorls five, with fine, parallel striæ, running obliquely across them ; suture distinctly impressed ; aperture rounded, contracted by

the lip, the plane of the aperture making a considerable angle with the plane of the base of the shell: pillar lip with a prominent, white, tooth-like process placed obliquely to the axis of the shell; lip white, widely reflected, and sometimes grooved on its face; exterior of the reflected lip yellowish; umbilicus exhibiting only one volution, partially covered by the reflected lip where it unites with the base of the shell.

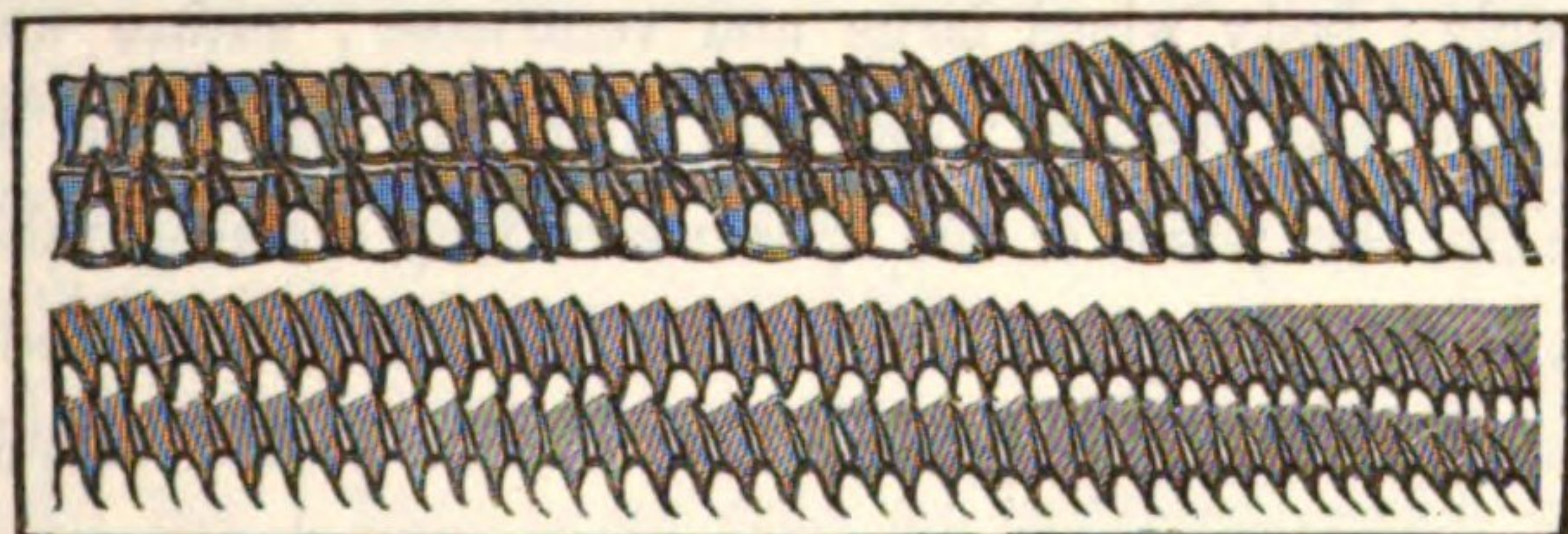
Extreme transverse diameter one inch, ordinarily three-fourths.

GEOGRAPHICAL DISTRIBUTION. Inhabits plentifully all the States from New York to Missouri, and from South Carolina to Arkansas. It is very common in the country bordering on the Ohio and Mississippi Rivers, and though sometimes found, is not common in the New England States.

REMARKS. This species bears a strong resemblance to *H. albolabris*, with which it is sometimes confounded. It has, however, striking specific characters, which are never wanting, and which will enable one always to distinguish it. These are, the partially closed umbilicus, and the tooth on the pillar lip. The yellow color on the posterior part of the reflected lip is also a very constant character; this is derived from the mantle of the animal, which, in a state of rest, frequently overlaps the margin of the aperture. It is a smaller shell than *H. albolabris*, and more convex, and the plane of the aperture makes a much larger angle with the plane of the base.

It varies considerably in appearance. Some individuals never reach half the standard size of the species. It is more or less globose, has the umbilicus sometimes covered, and at other times is destitute of the tooth. The animal, though usually yellowish, I have noticed to be in a few cases blackish. It is probable that the color of the animals of this genus is much influenced by the nature of their food.

Lister's figure, Synopsis Conch. etc. t. 91, f. 91, is probably intended to represent this species.



17. *HELIX EXOLETA*, BINNEY.

PLATE X.

H. testâ orbiculato-ventricosâ, imperforatâ, luteo-corneâ ; anfractibus transversè striatis ; striis confertis, obliquis ; appendiculo dentiformi, albo, columellæ obliquè adnato ; peristomate albo, margine reflexo.

SYNONYMS AND REFERENCES.

Helix zaleta, BINNEY, Boston Journ. Nat. Hist. I. 492, pl. 20.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

DE KAY, New York Report, 31.

Helix albolabris, var. FÉRUSSAC, Hist. pl. 46, a. f. 6.

DESCRIPTION.

ANIMAL grayish-brown or blackish above, paler on the posterior extremity and base; superior tentacles black, long, and slender; glands very prominent; length, when fully extended, including the tentacles, equal to thrice the breadth of the shell.

SHELL convex, somewhat ventricose; epidermis of a uniform, yellowish horn, or russet-color; whorls between five and six, with fine, parallel striæ crossing them obliquely; body whorl large and ventricose; suture well marked and distinct; aperture rounded, contracted by the lip, the plane of the aperture making a considerable angle with the plane of the base; lip white, reflected; pillar-lip with a prominent, white, oblique tooth; umbilicus covered.

Greatest transverse diameter, about one inch.

GEOGRAPHICAL DISTRIBUTION. Common in the States bordering on the Ohio River, in East Tennessee, the western parts of Virginia and Pennsylvania, and the northern States from New York to Missouri. I have not heard of its having been noticed in New England, or eastward of the Alleghany mountains.

REMARKS. This shell has frequently been confounded with *Helix albolabris*, Say; and I have seen it in cabinets labelled as a toothed variety of that species. It is, however, quite as distinct from it as the other allied species, and is generally received as an independent species.

Though resembling *H. albolabris* in many respects, it differs in general aspect, and in many very observable particulars. It is smaller, more convex, and the body whorl is more ventricose than in that species. The reflected lip is less flat and broad, and is sometimes a little grooved. The aperture is more round, and the plane of the mouth, instead of being flattened in the direction of the plane of the base, is much more upright, making a considerable angle with the base of the shell. Attention to these differences will enable one to distinguish the shell, even before the tooth is added. In those individuals where the tooth is wanting, there is often a slight deposition of testaceous matter in its place, not distinguishable without close observation.

The color of the animal varies in being more or less dark; but I have never seen an individual which approached the white, pearly, or cream color, which is so common in the animal of *H. albolabris*. The eggs are white, one-eighth of an inch in diameter, and are laid in the earth as deep as the body of the animal will extend, in clusters of about twenty.

There is certainly a strong resemblance between many of our species which, with *H. albolabris* as their type, form a well-marked division. But as their differences are as constant as their resemblances, it cannot be proper to unite them into one.

When I published the first description of this shell, in 1837, I adopted, without examination, the name *zaleta*, which I found applied to it in some cabinets, and which

I then supposed had been imposed by Mr. Say. Not having since been able to procure any information about its origin, and finding it to be destitute of meaning, and probably a corruption of the word intended to be used, I have ventured to substitute for it the specific name of *exoleta*. This word was undoubtedly suggested to the person first proposing it by the idea that the shell was the adult, or superannuated form of *H. albolabris*.

18. *HELIX DENTIFERA*, BINNEY.

PLATE XII.

H. testâ orbiculato-depressâ, imperforatâ, luteo-corneâ ; spirâ subplanulatâ, subtus convexâ ; anfractibus transversè striatis, striis crebris, minutis ; peristomate albo, margine latè reflexo ; columellâ valdè unidentatâ.

SYNONYMS AND REFERENCES.

- Helix dentifera*, BINNEY, Boston Journ. Nat. Hist. I. 494, pl. 21.
DE KAY, New York Report, 31.
ADAMS, Mollusca, &c., 9.
PFEIFFER, Monog. Helic. Viv. I. 317.

DESCRIPTION.

ANIMAL grayish on the sides and posterior extremity, brownish on the upper parts, darker on the head and neck, foot long and narrow, superior tentacles long and slender, eyes black.

SHELL flattened-convex on the upper surface, convex below ; epidermis yellowish horn-color, immaculate ;

spire depressed; whorls five, with delicate, parallel, oblique striæ; suture distinct, not deeply impressed; aperture contracted by the lip, flattened towards the plane of the base; lip white, broadly and abruptly reflected; pillar-lip with a prominent, white, tooth-like process nearly parallel with the lower margin of the aperture, not projecting towards the umbilicus; base convex.

Greatest transverse diameter, about three-quarters of an inch.

GEOGRAPHICAL DISTRIBUTION. Noticed by me, hitherto, only in the State of Vermont, on the eastern slope of the Green Mountains. Dr. De Kay includes it in his Catalogue of the Mollusca of New York; and it has also been found in Ohio.

REMARKS. This species does not appear to be common in the localities which it inhabits. Several years since, they were very numerous in the town of Strafford, Vermont, but have latterly entirely disappeared. It can only be compared with *Helix appressa*, the large variety of which it resembles. It differs from it, however, in having no projection on the inner margin of the lip, and in the character of the columellar tooth, which is straight and prominent, never curved. The lip is more acutely reflected, broader and more flattened, and the base is more convex. The general aspect of the two is quite different. *H. abjecta* is also similar in form, but is destitute of a tooth.

19. *HELIX PALLIATA*, SAY.

PLATES XIV., XV.

H. testâ orbiculato-depressâ, imperforatâ, castaneâ, hirsutâ; anfractibus minutè striatis; aperturâ angustâ, trilobatâ; labro albo, latè reflexo, dentibus duobus instructo; columellâ dente unico sub-arcuato, armatâ.

SYNONYMS AND REFERENCES.

Helix palliata, SAY, Journ. Acad. II. 152, anno 1821.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Bost. Jour. Nat. Hist. III. 353, pl. 7.

DE KAY, New York Report, 31.

ADAMS, Mollusca, 9.

Helix obstricta, SAY, loc. cit. II. 154.

Helix denotata, FÉRUSAC, Tab. 38, No. 102, anno 1822.

• Hist. &c. pl. 49. a. f. 5; pl. 50. a. f. 7.

DESHAYES in Lamarck, VIII. 115.

Helix notata, DESHAYES, Encyc. Meth. II. 224, No. 28.

Helix Caroliniensis, LEA, Am. Phil. Trans. IV. 108, pl. 15, f. 33.

Carocolla helicoides, LEA, loc. cit. IV. 159, pl. 15, f. 34.

DESCRIPTION.

ANIMAL. Of a uniform, blackish, slate color over the whole upper surface; foot narrow, in length double the diameter of the shell, and terminating in an acute point; superior tentacles one-third of an inch long; eyes not distinguishable from the general color.

SHELL depressed; epidermis dark brown or chestnut color, and rough with minute, acute projections and stiff hairs; whorls five, flattened above and rounded below, with numerous very fine, oblique striæ; aperture

three-lobed, much contracted by the lip and teeth; lip white, sometimes edged with brown, widely reflected, with two projecting teeth on the inner margin, the one near its junction with the body-whorl acute and prominent, the other, in the base of the aperture, long, lamellar, and but little prominent; pillar-lip with a very prominent, white, curved tooth, projecting nearly perpendicularly from the shell, and forming one boundary of the aperture; umbilicus covered with a white callus, the continuation of the reflected lip; base convex.

Greatest transverse diameter, nearly one inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Northern and Western States, and the Atlantic States as far south as South Carolina, and probably may be found in every State of the Union, and in Canada. It is most common in the Western States, where it attains its greatest size.

REMARKS. This is a remarkable species, easily distinguished from every other by its rough, hairy exterior, prominent falciform tooth on the columella, and contracted, trilobate aperture. As in all other imperforate species with reflected lip, the umbilicus remains open until the lip is completed; and, of course, the young shells are destitute of the most striking characteristics as above described. It resembles *H. tridentata*, Say, in its upper surface, so much that, when placed side by side, they might be considered identical; but on the lower surface the resemblance no longer holds; for, though the aper-

ture is nearly the same, the umbilicus of that species is never closed, and it never attains the size of the present species. The lower lip-tooth is also very different.

Varieties of the type are caused by the absence of the upper or lower lip-tooth, or of both, the want of the raised projections of the epidermis, and of the transverse striæ, and by the great depression of the spire in some individuals, which produces a distinct angle or carina on the outer whorl. This last variation brings it within the genus *Carocolla* of Lamarck, and shows that the distinctive characters of that genus are of no value.

A carinate variety, which was noticed by Mr. Say as "a variety with a very prominent, acute carina, destitute of minute protuberances," and having the carina crenulated by prominent transverse striæ, has been described by Mr. Lea as *Carocolla helicoides*. It is the same figured by Férussac, pl. 50, a. fig. 7.

A carinate striate variety with smooth epidermis, was described by Mr. Say as *Helix obstricta*.

Another variety, having the oblique striæ widely separated, and very distinct, and being at the same time somewhat carinate, has been described by Mr. Lea as *Helix Carolinensis*. An inspection of the shells from which these descriptions were made has convinced me that they are only varieties of this species.

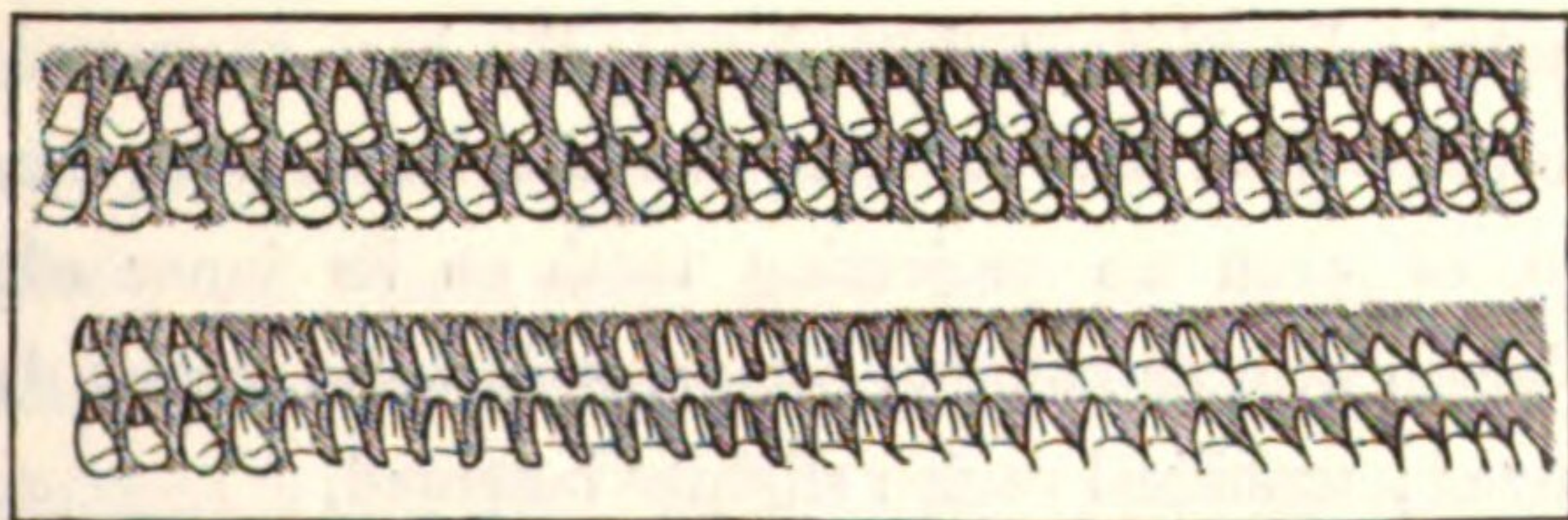
A singular variety is found in the neighborhood of Vicksburgh, Mississippi, in which the lip, though thickened and white within, is scarcely reflected, but forms a continuous line with the last whorl. Instead of being ap-

pressed to the base of the shell, so as to cover the umbilical opening, as is usual, it makes a curved line around the umbilicus, and projects perpendicularly from the base.

The smooth, amber-colored, finely striated variety is rare, and differs so much from the common type that it induces those who are not well acquainted with the species to consider it distinct. But the character of the aperture is the same in both; and all the intermediate modifications may be seen in the various collections.

Mr. Say's description was published in January, 1821; and the shell has been known in the United States by the name of *H. palliata* since that time. In 1822, the name of *H. denotata* was applied to it by Férussac. The editors of the new edition of Lamarck's *Animaux sans Vertèbres*, have chosen to retain the latter name; but, inasmuch as it is inconsistent with the rules of priority, as advocated by themselves, it ought not to obtain.

Plate XV. represents the variety of this species.



20. *HELIX APPRESSA*, SAY.

PLATE XIII.

H. testâ depressâ, imperforatâ, luteo-corneâ ; anfractibus obliquè striatis ; aperturâ angustâ ; labro albo, sub-dentato, margine reflexo ; collumellâ dente unico arcuato armatâ.

SYNONYMS AND REFERENCES.

- Helix appressa*, SAY, Journ. Acad. II. 154, anno 1821.
 KIRTLAND, Ohio Report, 172.
 BINNEY, Boston Journ. III. 356, pl. 8.
 DE KAY, New York Report, 31.
 CHEMNITZ Conch. 2d. ed. t. 63, f. 17, 18.
 PFEIFFER, Monog. Helic. Viv. I. 317.
Helix linguifera, LAMARCK, VI. 90, anno 1822.
 FÉRUSSAC, Prodr. 95 ; Hist. pl. 49, a. f. 3.
 DESHAYES in LAMARCK, VIII. 70.
 Encyc. Meth. II. 224.
Tridopsis appressa, BECK, Index, 22.

DESCRIPTION.

ANIMAL. Uniform blackish slate color, and resembling in all respects the animal of *Helix palliata*.

SHELL depressed ; epidermis yellowish horn-color ; whorls five, often somewhat angulated, with fine, distinct, transverse striæ ; aperture rather flattened, contracted ; lip white, reflected, near the base appressed to the body-whorl and covering the umbilicus, with one, or two, or even no projecting teeth on its inner edge ; pillar-lip with an oblique, compressed, white tooth ; base convex ; umbilical region slightly indented.

Greatest transverse diameter, less than three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Western and South-western States, and the western part of New York. Dr. Griffith has noticed it on the Lehigh, in Pennsylvania; and I have received it from the mountains of the Carolinas, Georgia, and Tennessee.

REMARKS. I consider this species not to be well established; but I retain it in deference to the opinions of conchologists generally, who differ from me. The description of Mr. Say hardly points out any difference between it and the preceding; and accordingly, varieties of *H. palliata* are commonly seen in cabinets as *H. appressa*. Well marked specimens of the two are very unlike; but they approach each other by nice, and hardly appreciable shades of difference, until they at length seem to blend into one. It is impossible to say how far the characters of shells are modified by the accident of their locality and other causes; but that they are so to a considerable degree is certain; and it appears to me that the differences between this and the preceding species are not greater than might be produced by the influence of external circumstances. The shell intended to be described is very common in the Western and South-western States, is usually only about half as large as *H. palliata*, and considerably more flattened in shape. It has a smooth and shining epidermis, without the hirsute projections, and is finely striated, and sometimes carinate. The lip is narrower and less broadly expanded, the aperture much less contracted, and the tooth on the pillar-lip

less prominent and thick than in that species. The teeth on the outer lip are sometimes entirely wanting, at other times very distinct; sometimes the upper, but usually the lower one is alone present. The lower lip-tooth is a lamellar enlargement of the lip, extending from the base nearly to the superior extremity of the lip. The smaller sized specimens resemble considerably *Helix inflecta*, Say; and it seems almost to form a connecting link between that species and *H. palliata*. The larger specimens are hardly inferior in size to individuals of the last-named species, which they closely resemble. Large specimens, without teeth on the outer lip, also resemble the species which I have called *Helix dentifera*; but that species never has the lip-teeth, and is not so much depressed. A favorite place of resort of this species is under flat stones about neglected quarries.

The first publication of a description of this shell was by Mr. Say, in the place referred to, in 1821; the next year a second appeared, by Lamarck, in the first edition of his *Animaux sans Vertèbres*, under the name of *Helix linguifera*, reference being made to Férussac's *Histoire des Mollusques*, which was not then published. Mr. Say's name ought, therefore, to be preferred.

21. *HELIX INFLECTA*, SAY.

PLATE XLV. FIGURE 3.

H. testâ orbiculato-depressâ, imperforatâ, corneo-lutescente, rarè hirsutâ ; anfractibus striatis, striis minutis, obliquis ; aperturâ angustissimâ, trilobatâ ; labro albo, dentibus duobus, acutis, inflectis, armato ; margine reflexo ; regione umbilicali impressâ ; dente albo, arcuato ad columellam affixo.

SYNONYMS AND REFERENCES.

Helix inflecta, SAY, Journ. Acad. II. 153, anno 1821.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Boston Journ. III. 358, pl. 9, f. 1.

Helix clausa, FÉRUSSAC, Tab. Syst. 38, No. 104.

Hist. pl. 51, f. 2.

DESHAYES, Encyc. Meth. II. 230.

in Lamarck, VIII. 114.

PFEIFFER, Monog. Helic. Viv. I. 420.

CHEMNITZ, 2d ed. t. 64, f. 25, 26.

Gonostoma clausum, HELD, Isis, 1837.

Tridopsis inflecta, BECK, Index, 22.

DESCRIPTION.

ANIMAL dark bluish slate color, head and tentacles almost black ; superior tentacles long and slender ; foot narrow, in length more than twice the diameter of the shell, terminating in an acute angle.

SHELL depressed ; epidermis brownish horn color, sometimes with very fine, hair-like projections ; whorls five, with very minute, transverse striæ ; suture not much impressed ; aperture three-lobed, very much contracted ;

lip white, narrow, reflected, with a deep groove or indentation behind the reflection, contracting the opening so that the outer edge of the lip does not project beyond the surface of the whorl; on the inner margin of the lip are two acute teeth, with the points directed inwards, one near the base, the other midway between that and the junction of the lip with the body-whorl, with a circular sinus between them, forming one of the lobes of the aperture; pillar-lip with a long, arcuated, white tooth; umbilicus covered, its place considerably impressed.

Greatest transverse diameter, one half of an inch; ordinary size, about one-third of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States, on the borders of the Ohio and Mississippi Rivers; it was noticed by Mr. Say in Missouri, and by others in North Carolina, Tennessee, Arkansas, and Michigan. It has not been observed upon the Atlantic coast.

REMARKS. This species is not likely to be mistaken for any other. It resembles that variety of *Helix tridentata* called by Mr. Say *Helix fallax*; but it differs from it in having the umbilicus entirely covered. The resemblances of the two are in some instances so striking as to suggest the thought, that the greater development of the lip at its junction with the base of the shell may be only an accidental circumstance, due to locality or some other cause; and that the two may be only varieties. The umbilicus, in those species which possess it, is so

variable in its characters that it cannot be depended upon alone, for specific distinctions.

Large individuals resemble in general appearance *H. appressa*, SAY. The epidermis is sometimes delicately hirsute, and the aperture of a rose color. The lip is occasionally destitute of one or both teeth. The name *Helix inflecta*, by which it is universally known in the United States, and the description, were published in 1821 by Mr. Say, more than a year before it was noticed by other naturalists, and several years before any other description appeared.

Lister's figure, Synops. Conch. tab. 93, fig. 93, probably represents this shell.

22. HELIX LORICATA, GOULD.

PLATE XXIX. a. FIGURE 2.

H. testâ parvâ, depressâ, flavo-viridi, arctè umbilicatâ, squamulis undique loricatâ; spirâ depressâ, anfractibus $5\frac{1}{2}$ convexiusculis, ultimo ad peripheriam supernè subangulato; aperturâ lunatâ, trilobatâ, dente laterali, dente basali, et dente columellari ringente; peristomate reflexo, albo, callo copioso conjuncto.

SYNONYMS AND REFERENCES.

Helix loricata, GOULD, Proc. Bost. Soc. Nat. Hist. II. 165, Aug. 1846.

Exped. Shells, p. 17.

PFEIFFER, Monog. Helic. Viv. I. 416.

DESCRIPTION.

ANIMAL, not yet observed.

SHELL small, depressed, spire less convex than the

base, thin, of a yellowish green color, having the surface everywhere ornamented with small, crescent-formed scales of the epidermis, in relief, arranged along the lines of growth, and in quincunx. Whorls five and a half, slightly convex, separated by a deeply impressed suture, and forming a low, conical spire; the periphery of the last whorl is slightly angular near its posterior portion. The base is rounded, tending rapidly to a deep, umbilical depression, with a small perforation. Aperture small, crescentic, having a small, acute tooth on the right margin, a transversely oblong one at base, and a prominent, compressed, curved, nearly horizontal one on the columella, thus giving a three-lobed outline to the aperture. Peristome white, slightly reflected, having a very profound constriction of the whorl directly behind it.

Diameter one-fourth of an inch; axis three-twentieths of an inch.

GEOGRAPHICAL DISTRIBUTION. The specimen from which this description was drawn was brought by the U. S. Exploring Expedition from the Sacramento River, in California.

REMARKS. Its general form, and its aperture, are very much like *H. inflecta*, Say, though it is a much smaller shell, and the teeth of the aperture are less developed. Its peculiar surface, resembling a scaly coat of mail, when closely examined, is highly characteristic. It is interesting as another example of species from the west of the Rocky Mountain range resembling forms on the eastern side.—[G.]

23. HELIX MONODON, RACKETT.

PLATE XLI.

H. testâ convexiusculâ, umbilicatâ, sive imperforatâ, corneo-fuscescente, hispidulâ, tenuissimè striatâ; aperturâ semilunatâ; labro albo, margine angusto, reflexo; dente unico albo, longo, compresso, ad columellam obliquè adnato; regione umbilicali impressâ.

SYNONYMS AND REFERENCES.

Helix monodon, RACKETT, loc. cit. XIII. 42, pl. 5, f. 2.

WOOD, loc. cit. Supplem. pl. 7, f. 15.

BINNEY, Bost. Journ. Nat. Hist. III. 360, pl. 10, f. 1.

GOULD, Invertebrata, 174, f. 113.

ADAMS, Mollusca of Vermont, 9.

Helix fraterna, SAY, Exped. St. Peters, II. 257, pl. 15, f. 3.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Boston Journ. Nat. Hist. III. 363, pl. 10, f. 2.

DE KAY, New York Report, 31.

Helix convexa, DESHAYES in Lamarck, VIII. 112. Encyc. Meth. II. 253.

FÉRUSSAC, Hist. pl. 50, a. f. 2.

CHEM. 2ed. t. 10. f. 17, 18; t. 66. f. 24-27.

PFEIFFER, Monog. Helic. Viv. I. 420.

DESCRIPTION.

ANIMAL yellowish brown, darker on the head, neck, and tentacles. Foot narrow, cylindrical, one and a half times as long as the diameter of the shell, terminating in a point. Superior tentacles one-fourth of an inch long. Eyes black. Some individuals much darker than others.

SHELL slightly convex; epidermis varying from light russet to chestnut color, with numerous very minute, hairy projections; whorls five to six, narrow, diminishing very gradually in width from the outer whorl to the

apex ; aperture somewhat flattened, arcuated, contracted by a deep groove behind the lip ; lip white, narrow, a little grooved on its face, reflected, extending on the base to, and slightly contracting or wholly covering, the umbilicus, its outer edge not projecting above the surface of the whorl ; umbilicus open, deep, but not exhibiting all the volutions, or partially covered by the extended lip, or entirely closed ; base rounded, indented in the region of the umbilicus, with a compressed, elongated white tooth at the edge of the aperture.

Greatest transverse diameter nearly one half of an inch, ordinary size much less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the New England States, in some parts of which it is very common, the States bordering upon the lakes, the Ohio River, and the Mississippi as far south as Louisiana, and in Canada. It will probably be found throughout the Middle States, and in the hilly parts of the Southern States.

REMARKS. The varieties of this shell present remarkable differences in size, coloring, and in the form of the umbilicus. The transverse diameter varies from one-sixth to three-sixths of an inch, and the form from subglobular in small specimens to a very flattened shape in the larger. The coloring exhibits every shade, from light amber to dark chestnut. The whorls of some revolve about the axis at such a distance as to leave a deep and wide umbilicus ; while in others they are in such near approximation as to permit only a small per-

foration, which the narrow, reflected lip is sufficiently wide to cover.

The hairy projections of the epidermis are most distinct upon the young shells, but are often wanting at every stage of growth. The oblique striæ are so fine as hardly to be visible ; and in some instances the shell appears to be glabrous. Very beautiful specimens, about one-fourth of an inch in diameter, with a dark, shining epidermis and open umbilicus, occur in Ohio. They are more convex, and, as the same number of volutions is contained in half the space, they *appear* to have more whorls than the common variety. Some persons have considered these to form a distinct species (*H. leaii*, Ward, Mss.) ; but I do not see that they can, with propriety, be separated.

In the Western States, this species is generally found in the forests. In New Hampshire and Vermont, it is also found in forests with other species, but more commonly in hill-side pastures, under flat stones, a situation where other species rarely occur. Two individuals are commonly found together.

I was formerly induced to believe that the two principal varieties of this species were specifically distinct ; but a careful investigation of a great number of specimens has convinced me that there are no definite limits to either of them, but that both are by imperceptible gradations blended together.

The first published description of this species appeared in 1821, under the name of *Helix monodon* ; in 1824, Mr. Say published his description, and proposed the spe-

cific name of *fraterna*; and in 1828, Wood gave a figure of it as *H. monodon*. Yet, notwithstanding these proofs that it was well known in England and the United States, M. Deshayes, in 1830, ten years after the first publication, produced another description under the name of *Helix convexa*, a name already preoccupied; and has retained it in the second edition of the "Animaux sans Vertebres," in 1838. Lister's figure, Synops. Conch. t. 93, f. 94, represents this species.

24. *HELIX HIRSUTA*, SAY.

PLATE XLII. FIGURES 3, 4.

H. testâ parvâ, globulosâ, imperforatâ, castaneâ, hirsutâ, subtus convexâ; aperturâ angustissimâ; labro intus incrasato, margine interno fissurâ diviso; dente laminato, elongato, ad columellam affixo.

SYNONYMS AND REFERENCES.

Helix hirsuta, SAY, Journ. Acad. I. 17, II. 161.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Bost. Journ. Nat. Hist. III. 365, pl. 10, f. 3.

DE KAY, New York Report, 31.

GOULD, Invertebrata, 175, pl. 116.

FÉRUSAC, Tab. Syst. 38. Hist. pl. 50, a. f. 1, and 3.

DESHAYES in Lamarck, VIII. 113.

Encyc. Meth. II. 253.

Helix stenotrema, FER., Mus. fide Pfeif.; Symb. II. 39.

CHEMNITZ, 2 ed. t. 65. f. 12-14.

PFEIFFER, Monog. Helic. Viv. I. 421.

Helix fraterna, WOOD, loc. cit. Supplem. pl. 8, f. 16.

Helix porcina, SAY, Long's Exped. II. 257, pl. 15, f. 2. (young.)

Tridopsis hirsuta, BECK, Index, 22.

DESCRIPTION.

ANIMAL whitish, head and tentacles slate color; foot slender, semitransparent, length less than twice the diameter of the shell, terminating acutely. Cavity of the tentacles apparent, when they are retracted, by two dark lines with a white space between.

SHELL sub-globose; epidermis brownish, or chestnut, covered with numerous, sharp, rigid hairs; whorls five, rounded; suture distinct; aperture contracted, very narrow, almost closed by an elongated, lamelliform tooth, situated on the pillar-lip, and extending from the centre of the base, within the junction of the lip with the outer whorl, into the edge of the aperture; lip narrow, very much depressed, and reflected against the outer whorl, with a deep cleft or fissure near the centre of the inner margin; umbilicus wholly covered; base convex.

Greatest transverse diameter nearly one half of an inch; ordinary size less than one-fourth.

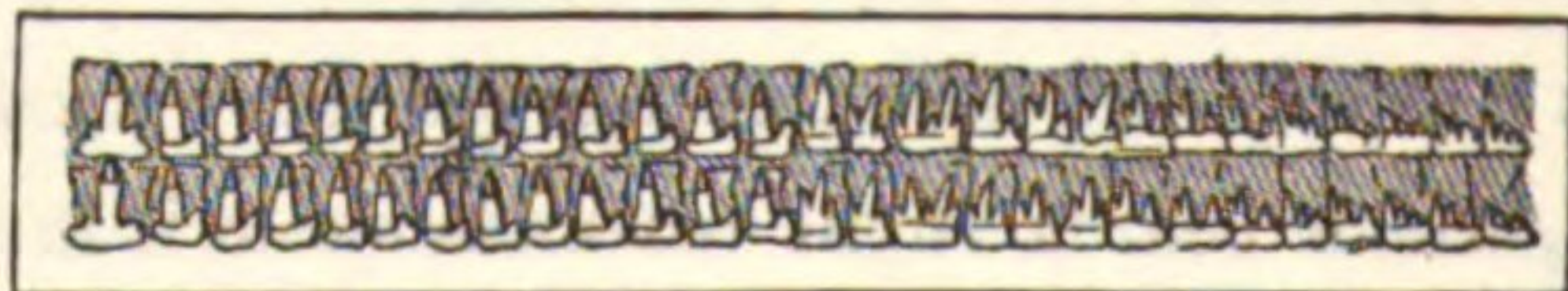
GEOGRAPHICAL DISTRIBUTION. Inhabits the Middle, and all the Western States, where it is common, and the New England States more rarely. In Massachusetts it is an uncommon shell.

REMARKS. This is a very peculiar species. The singular abrupt fissure on the inner edge of the lip distinguishes it from every other, except the three succeeding species, which bear a slight resemblance to it in this respect. It varies in diameter from one-sixth to one-half an

inch; the smaller specimens being nearly globular, and the large strongly convex above and below. The external color varies from corneous to dark chestnut; that of the parts about the aperture from whitish to light rufous. The surface is usually covered with a hairy vesture, but it is sometimes quite smooth. There is often a tooth-like projection on the superior and inner part of the lip, opposite to the termination of the columellar tooth, immediately above which there is an angular depression. Large individuals have six whorls. The lip cannot strictly be said to be reflected; it is depressed below the surface of the whorl, and a thin, testaceous deposit is laid back against it, causing it to appear as if the lip were absorbed into the whorl. I have once or twice noticed a single white band on the outer whorl.

Wood has figured this and the preceding species in the supplement to his *Index Testaceologicus*, but has caused great confusion by mistaking the present species for *Helix fraterna*, Say, which it resembles only in size.

Another shell was described under this name by the Abbé Brumati, in his "Catologo Sistemico," published in 1836; but it cannot displace Mr. Say's species, which had been known by his name thirteen years. *Helix porcina* of Mr. Say appears to correspond to this species in an immature state.



25. HELIX SPINOSA, LEA.

PLATE XLIV.

H. testâ lenticulari, carinatâ, tenui, imperforatâ ; epidermide castaneâ hirsutiusculâ ; spirâ planulatâ, subtus convexâ ; aperturâ angustissimâ ; columellâ dente unico, longo, laminato, armatâ ; labro incrassato, sinuato, ad marginem superiorem angulato et subreflexo.

SYNONYMS AND REFERENCES.

Carocolla spinosa, LEA, Am. Phil. Trans. IV. 104, pl. 15, f. 35.

Helix spinosa, BINNEY, Boston Journ. Nat. Hist. III. 367, pl. 11, f. 2.

PFEIFFER, Monog. Helic. Viv. I. 421.

Caro olla Edgariana, LEA, Proc. Am. Philos. Soc. II. 31. (var.)

Trans. Am. Philos. Soc. N. S. IX. 2.

DESCRIPTION.

ANIMAL not yet observed.

SHELL lenticular, with the upper surface much flattened, acutely carinated ; epidermis dark chestnut color, with minute, hair-like processes lying flat upon the whorls in the direction of their lines of growth ; whorls six, of nearly uniform width, and decreasing very gradually from the aperture to the spire ; suture distinct, slightly raised ; aperture very narrow ; lip yellowish-white, near its junction with the body-whorl thickened, angulated, and slightly reflected ; pillar-lip with a long, yellowish, narrow, projecting tooth, extending from the umbilical axis to the angle of the outer lip, and parallel with its thickened edge ; base convex, with the umbilical region slightly indented.

Greatest transverse diameter rather more than half an inch.

GEOGRAPHICAL DISTRIBUTION. Noticed, hitherto, only in the upper parts of Alabama, Georgia, and Tennessee, but will probably be found in all the South-western States.

REMARKS. This is a beautiful and singular species. Its form is very much flattened above, and it is acutely carinated. The epidermis, in good specimens, is chestnut-colored, and covered with prostrate hairs; these are partially noticeable on the edge of the carina, and suggested to Mr. Lea the specific name *spinosa*. The base is somewhat convex, and is remarkable for the long, narrow tooth which, rising from an indentation of the umbilical axis, and running parallel with, and closely approximating to the lip, terminates near where the latter joins the body-whorl. The aperture is merely a narrow space left between this tooth and the lip, and is so small that it appears hardly possible that the animal should be able to pass through it. In most specimens there is an indentation in the lip, about midway of its length, resembling the cleft in the lip of *Helix hirsuta*.

The surface of each whorl is placed in the slightest possible degree below the edge of the preceding whorl, so that the suture is defined by a raised line of hardly appreciable diameter. In its early age, the base is broadly umbilicated, and the hairs, equal in length to two-thirds the width of a whorl, project from the periphery of each of them like a fringe.

The aspect of the base of this shell somewhat resembles that of *Helix hirsuta*, Say ; but its superior size and carinated edges at once prevent its being considered the same. Moreover, instead of the fissure at the inner margin of the outer lip, we have only a slight flexure or emargination. It is, indeed, among the most distinctly marked of our species, and cannot be mistaken for any other.

HELIX EDGARIANA. [There is a small variety of this species, having about half the usual diameter, and having its faces much more convex, which Mr. Lea has described under the name of *Carocolla Edgariana*. Mr. Lea says its aperture has the form of *H. hirsuta*, except that the superior and thick part of the lip joins the tooth of the columella. We are not yet prepared to admit this as a distinct species, though farther researches may prove it to be so. The junction of the lip with the columellar tooth seems to have been accidental in Mr. Lea's specimens ; at least, we have several specimens, corresponding to his in other respects, where this character is wanting. Moreover, there is a large, carinated variety of *H. hirsuta*, from the same locality, which so far as the aperture is concerned, corresponds still better with Mr. Lea's description. His other character, by which he distinguishes *H. edgariana* from *H. spinosa*, its being without cilia, is not constant ; for fresh specimens of both large and small are well garnished with hairs, quite

as abundantly as in *H. hirsuta*; and the difference in the two species is that in the latter, the hairs are erect, while in *H. spinosa* they are prostrate. Unfortunately, the engravings were made from specimens destitute of hairs.—G.]

26. HELIX GERMANA, GOULD.

PLATE XL.a. FIGURE 3.

H. testâ parvâ, imperforatâ, globoso-lenticulari, ad peripheriam sub-angulatâ, epidermide rufo-corneo, sparsim hirsuto indutâ; anfractibus $5\frac{1}{2}$ convexis; suturâ impressâ; aperturâ lunatâ, laminâ albâ, obliquâ, erectâ, munito; labro incumbente, reflexo, roseo.

DESCRIPTION.

SHELL small, solid, imperforate, depressed, low-conical above, convex beneath, slightly angular at periphery, covered with a scabrous, rusty horn-colored epidermis, beset with scattered hairs. Whorls five and a half, closely revolving, separated by a well impressed suture; aperture lunate, the basal portion being but slightly curved, and turning upward at a rather sharp angle; lip incumbent, with a deep stricture behind it, moderately reflexed, roseate; on the intruding portion of the penult whorl is a distinct, oblong, erect, white tooth, not connected with either extremity of the lip.

Diameter three-tenths of an inch; axis one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. This shell was brought from the Pacific coast by the U. S. Exploring Expedition, and was marked Oregon.

REMARKS. At first sight this would not be distinguished from *H. monodon*. But, besides coming from a different zoölogical region, it has an imperforate, convex base, like *H. hirsuta*, instead of the pitted umbilical region which *H. monodon* has, whether perforated or not; and the hairs are much more sparsely distributed, being not more than one-fourth as numerous. The basal portion is less arcuated, so that the aperture is more transversely elongated, and less properly crescentic.—[G.]

27. HELIX MAXILLATA, GOULD.

PLATE XL.a. FIGURE 2.

H. testâ parvâ, globoso-lenticulari, solidulâ, castaneâ, H. hirsutæ simili; aperturâ lineari; labro reflexo, integro præter emarginationem dente obsoleto divisam, fauce lamellam sicut maxillam pone labrum gerente; lamellâ columellari rectâ, supernè bifurcatâ.

SYNONYMS AND REFERENCES.

Helix maxillata, GOULD, Proc. Bost. Soc. Nat. Hist. III. 38, July, 1848.

DESCRIPTION.

SHELL small, rather solid, of a rounded lenticular form and pale chestnut color, resembling very closely *H. hirsuta*. Besides being considerably smaller, a close

inspection of the aperture shows a different structure. The aperture is very narrow, and nearly closed by an elongated lamina on the pillar margin, which is dilated, or rather bifurcated, at its outer end. The outer lip is narrow, reflexed, and has an emargination near its upper junction, which is divided into two portions by a toothlike process; and alongside of the lip, but nearly concealed within the fauces, is another lamina, leaving a mere fissure for the exit of the animal.

Diameter one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Brought by Mr. Bartlett from Tennessee.

REMARKS. This is another interesting example, among several recently furnished by an exploration of the South-western States, of the gradual transition, by almost imperceptible modifications, from one species to another, and of the many changes which are wrought by the varied combination of a few characters signaling a group. However great its general resemblance to *H. hirsuta* may be, this species is decidedly characterized by the singular, jaw-like plate within the fauces.—[G.]

B. umbilicus open.

c. Aperture without teeth.

28. HELIX NUTTALLIANA.

PLATE XVIII.

H. testâ sub-conicâ, subtus convexâ, umbilicatâ, tenuiter striatâ; colore supernè luteâ aut fuscâ, subtus castaneâ; anfractibus septem, fasciâ nigrâ aut castaneâ cinctis; aperturâ sub-rotundatâ, depressâ, intus fasciatâ; labro sub-reflexo; columellâ lævi.

SYNONYMS AND REFERENCES.

Helix nuttalliana, LEA, Am. Phil. Trans. VI. 88, pl. 23, f. 74.

BINNEY, Boston Journ. Nat. Hist. III. 369, pl. 12.

DE KAY, Nat. Hist. New York, p. 46.

Helix fidelis, GRAY, Proc. Z. S. July, 1834, p. 67.

PFEIFFER Monog. Helic. Viv. I. 338.

DESCRIPTION.

ANIMAL. Color dull ochre, slaty towards the tail. Coarsely granular upon the neck; but from a line running from the dorsal line, where it issues from the shell, to the mouth, the granules diminish, and are succeeded by coarse, undulating, interrupted ridges, radiating in every direction from the aperture, and terminating in a line nearly marginal; edge simple.

SHELL sub-conical; epidermis light yellow or brownish on the upper surface, with a black or chestnut colored, revolving band visible on the four outer whorls, the lower surface dark chestnut; suture distinct, im-

pressed; whorls seven, rounded, spirally striate, with minute, delicate, impressed lines, the striæ of increase very distinct; lip reflected below, simple above; aperture ovate; umbilicus open, a little contracted by the reflection of the lip; base flattened-convex.

Greatest transverse diameter nearly one and a half inches.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Oregon Territory from Fort Vancouver to the ocean, where it was discovered by Mr Nuttall during his late expedition, and also, rather commonly, by the U. S. Exploring Expedition.

REMARKS. This beautiful species is unlike any other North American Helix, being much more brilliant in its coloring and more striking in its markings than is common. The upper surface, in those specimens which have come under my observation, is either light yellow, strongly contrasted with a single dark band revolving on the middle of the body-whorl, and on the lower edge of the other whorls, or a light chestnut with a black band. The lower surface, or base, is of a uniform dark chestnut color. On some individuals there is a faint tracing of intermediate bands, and some are quite destitute of bands; so that it is probable, that when the shell becomes more common, it may be found that there is considerable diversity of coloring and marking. The lip varies from ashy-white to rufous. The revolving band is generally obsolete on the three whorls nearest the apex.

The spire rises in a subconical form to the apex, each whorl gradually and regularly diminishing, from the body-whorl upwards. The whorls are convex, the striæ of growth regular and fine and very delicate. Crowded, impressed lines revolve upon the whorls. The lip is distinctly reflected at the base of the shell; but the reflection diminishes towards its upper part, and becomes entirely obsolete before it joins the body-whorl. The umbilicus is of inconsiderable diameter, but deep, and is somewhat encroached upon by the reflection of the lip.

The description of the animal has been drawn from Mr. Drayton's figure in the Mollusca of the Exploring Expedition.

Dr. Pfeiffer regards this as the *H. fidelis*, Gray, (Proc. Zoöl. Soc. July, 1834, p. 67.) and has so catalogued it in his Monography, I. 338. If it is really so, Mr. Gray's description anticipates that of Mr. Lea about five months.

29. HELIX TOWNSENDIANA, LEA.

PLATE XIX.

H. testâ orbiculato-convexâ, luteo-rufescente, rugosâ, umbilicatâ; aperturâ sub-rotundatâ; labro albo, reflexo, ad basim internè incrassato; columellâ lævi; basi tumido.

SYNONYMS AND REFERENCES.

Helix Townsendiana, LEA, Am. Phil. Trans. VI. 99, pl. 23, f. 80.

BINNEY, Boston Jour. Nat. Hist. III. 371, pl. 13.

DE KAY, Nat. Hist. New York, p. 46.

PFEIFFER, Monog. Helic. Viv. I. 341.

DESCRIPTION.

ANIMAL corpulent, gradually tapering. Color pale yellowish green; surface with rather sparse, feebly developed, elliptical granules, not seeming to have any regular arrangement. Margin of disk rather broad, granulated, but regularly marked with radiating furrows.

SHELL obtusely convex; epidermis yellowish and brownish horn-color more or less intermixed; suture distinct; whorls five and a half, with minute, impressed, longitudinal striæ, which can scarcely be traced by the eye, and coarse, oblique wrinkles and striæ; body-whorl large, voluminous, rough, and corrugated; aperture rather large, somewhat rounded; lip white, fully reflected at the base, and but partially so towards its superior part, thickened and a little projecting internally in the base of the aperture; umbilicus open, deep, a little contracted by the reflection of the lip; base convex and turgid.

Greatest transverse diameter one inch and three-eighths.

GEOGRAPHICAL DISTRIBUTION. Inhabits the neighborhood of the Wahlamat, near its junction with Columbia River, whence it was brought by Mr. Nuttall, by Dr. Townsend, and by the U. S. Exploring Expedition.

REMARKS. This shell is peculiar by the irregular

corrugations and depressions on its surface, and the singular intermixture of colors, the prominent parts being yellow and the depressions brown or chestnut. The spire is usually more regularly striated and rufous. The color internally is rufous or chestnut.

The upper surface resembles in general aspect large and coarse specimens of *H. albolabris*, Say. The number and arrangement of the whorls are the same, and the size corresponds; but the epidermis is much more yellow, and the delicate and beautiful oblique striæ of that species are replaced by rough corrugations. The body-whorl is also decidedly larger and more voluminous, and the aperture is consequently larger. On the lower surface the resemblance disappears; the umbilicus being open and deep, the lip much less reflected and not flattened, and the aperture more rounded. The greater capacity of the body-whorl is also more apparent on the base. In size, color, and sculpture, it resembles *H. tudiculata*, Lea, but it is more depressed, and has a very different base. It is a peculiar and marked species.

30. HELIX CONCAVA, SAY.

PLATE XXI.

H. testâ planulatâ, latè umbilicatâ, albido-corneâ; anfractibus quinque ad basim rotundatis; aperturâ sub-rotundatâ, supernè depressâ; labro subtus reflexo, supra simplici; columellâ brevi, callosâ.

SYNONYMS AND REFERENCES.

Helix concava, SAY, Journ. Acad. II. 159, anno 1821.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Bost. Jour. Nat. Hist. III. 372, pl. 14.

ADAMS, Vermont Mollusca, 9.

DE KAY, Nat. Hist. New York, p. 33, pl. 2, f. 15, a. b.

Helix planorboides, FÉRUSAC, Tab. Syst. 45.

Hist. Nat. des Moll. tab. 82, f. 4.

PFEIFFER, Monog. Helic. Viv. I. 200.

Symbolæ, II. 37.

Circinaria planorboides, Beck, Index, p. 24.

DESCRIPTION.

ANIMAL. Upper surface grayish, tentacles bluish, base dirty-white, color reddish-orange, posterior extremity slightly tinged with the same. Tentacles slender, cavities into which they are retracted visible, foot narrow, twice as long as the diameter of the shell.

SHELL depressed, very slightly convex on the upper surface; epidermis whitish horn-color, sometimes with a tinge of green; whorls five, above flattened, below rounded, finely striate obliquely, the outer whorl spreading a little towards the aperture; suture rather deeply impressed; umbilicus wide, deep, exhibiting all the volutions to the apex; aperture rounded, somewhat flattened above, its edge frequently tinged with reddish brown; lip sub-reflected at the base of the shell, simple above, and in some specimens considerably depressed near its junction with the outer whorl; columella with a thin callosus, the edge of which connects the upper and lower extremes of the lip.

Greatest transverse diameter, three-fourths of an inch.
Common size half an inch.

GEOGRAPHICAL DISTRIBUTION. This species has been noticed in Michigan, Vermont, New York, Virginia, Georgia, Tennessee, Ohio, Illinois, Missouri, and the North-western Territory. It may, therefore, be considered to inhabit the whole territory of the United States.

REMARKS. This shell, though frequently seen, does not seem to be so numerous in our forests as some other species. It is peculiar for the elegant, rounded shape of the whorls, as seen on their lower surface. It rarely varies from the common type, and cannot be mistaken for any other species, with the exception hereafter mentioned. The animal is voracious in its appetite, almost always preying upon other species with which it may be kept, and so certainly destroying them that I have been obliged to keep them by themselves. This they effect by inserting their narrow bodies, which they have the power of elongating and protruding very far from their own shells, into the shells of their victims, and then feeding upon them at their leisure. It burrows in the soil under decaying logs.

The earliest description of this shell was by Mr. Say, in 1821, under the name of *H. concava*. Férussac noticed it (without description or figure) in 1822, as *H. planorboides*, and some years afterwards gave a figure of it under the same name. Mr. Say's name has

therefore the right of priority, and is universally adopted in this country, as it should be elsewhere. Férussac quotes Rafinesque for the specific name in this case, as well as in some others; but it is not known when or where his descriptions were published.

In a former account of this species, I considered it to be identical with *H. Vancouverensis*, Lea, for reasons then given. Good authorities have differed from me in opinion; and in deference to them, but without entire conviction on my part, I now treat them as distinct. A more particular notice of their differences and resemblances is given in the remarks on that species, which immediately follows.

31. *HELIX VANCOUVERENSIS*, LEA.

PLATE XX.

H. testâ planulatâ, latè umbilicatâ, luteolo-viridescente; anfractibus quinis, ad basim rotundatis; aperturâ transversâ sub-circulari, supernè depressâ; labro subtus sub-reflexo, supra simplici; columellâ brevi, callosâ.

SYNONYMS AND REFERENCES.

Helix Vancouverensis, LEA, Am. Phil. Trans. VI. 87, pl. 23, f. 72.

DE KAY, Nat. Hist. New York, p. 45.

PFEIFFER, Symbolæ, II. 41.

Monog. Helic. Viv. I. 200.

Helix concava, BINNEY, Bost. Journ. Nat. Hist. III. 372, pl. 14.

DESCRIPTION.

ANIMAL short posteriorly, sub-cylindrical, very light colored, giving a straw-colored reflection, sides pearly,

marked with longitudinal lines of coarse, elongated, squamose granules, about eight or ten on each side.

SHELL depressed, very slightly convex on the upper surface; epidermis light greenish-yellow; whorls five, nearly flat above, protuberant and rounded on the lower surface, lines of growth very minute, the outer whorl expanding a little towards the aperture; umbilicus wide and deep; aperture transverse, somewhat rounded, flattened above by a depression of the lip near its junction with the body-whorl, its edge tinged with rufous; lip slightly reflected at the base of the shell, simple above, the two extremities approaching each other, and connected by a thin callus, which covers the columella.

Greatest transverse diameter one inch and a quarter.

GEOGRAPHICAL DISTRIBUTION. Brought by Mr. Nuttall, and by the U. S. Exploring Expedition, from the shores of Columbia River, where it is said to be common.

REMARKS. As before remarked, I have heretofore considered this shell to be identical with *H. concava*, Say. At first sight, the difference of size and color is so striking, that it appears to be distinct from that; but on further examination, it is found that there is a strong resemblance in every particular usually relied on in the discrimination of species. The specific characters on which Mr. Lea seems to have relied are the "remarkable depression" of the upper part of the lip, and the cal-

lus uniting its upper and lower terminations ; but these are common in *H. concava*. Of numbers which I have examined, the greater part have the depression, and all except the young have the uniting callus.

The differences observable are the following : the size of this shell greatly exceeds the former in all its proportions, its transverse diameter being nearly twice as great. This difference is not caused by an increased number of whorls, for the number in both is precisely the same ; but this shell seems to be projected originally upon a larger scale, the nucleus being as much larger as mature specimens. The color is a light greenish, or rusty yellow. The umbilicus is not so widely expanded, and does not admit of counting all the whorls ; and the whorls seem to be more voluminous. The striæ of growth are usually coarser.

When specimens of this shell shall be obtained in sufficient numbers for comparison, the question of its identity with the other can be satisfactorily settled. In the mean time, it will probably be received as a good species. The color of the animal, also, as given by Mr. Drayton in the drawings of the Exploring Expedition, from which our description is derived, as well as the form of the foot, go to establish the difference in question.

32. HELIX COLUMBIANA, LEA.

PLATE V.

H. testâ orbiculato-depressâ, perforatâ, corneâ ; anfractibus sex, minutissimè striatis ; spirâ depressâ, apice acuminato ; aperturâ transversâ ; labro reflexo ; basi sub-depressâ.

SYNONYMS AND REFERENCES.

Helix columbiana, LEA, Am. Phil. Trans. VI. 89, pl. 23, f. 75.

DE KAY, Nat. Hist. New York, p. 46.

PFEIFFER, Monog. Helic. Viv. I. 343.

DESCRIPTION.

ANIMAL not hitherto observed.

SHELL sub-depressed ; epidermis rather smooth, corneous ; whorls six, slightly rounded, very minutely striated, rising gradually, but regularly, one above the other to an acuminate apex ; suture strongly impressed ; aperture transverse, a little contracted and thickened, by a testaceous deposit or border, at the angle of reflection of the lip ; lip whitish, or brownish white, reflected but not flattened, rather grooved on its face, the basal margin horizontal in its direction, with a slight thickening or projection before it reaches the base of the shell ; umbilicus open, partially hidden by the reflected lip at its junction with the base ; base a little flattened.

Transverse diameter about five-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found near Fort

Vancouver, Oregon Territory, whence numerous specimens were brought by Mr. Nuttall, and by the Exploring Expedition. It was also brought by Mr. Hinds from the region of Nootka Sound.

REMARKS. This species is remarkable for the prominence and distinctness of the smaller whorls to the very apex. They rise above each other with such a regular diminution from the outer whorl to the point, that the profile resembles a depressed cone. It is of very nearly the same size as *H. clausa*, Say, which it resembles in general appearance; but it has one more whorl, is more flattened, has a more conical spire, and less rounded whorls, and wants the rounded aperture. The umbilicus is also more open than in that species. The general shape is much less globular. It must also be compared with the next species.

33. *HELIX LABIOSA*, GOULD.

PLATE. XIII. *a*. FIGURE 1.

H. testâ depresso-conicâ, subtus convexâ, arctè umbilicatâ, luteo-corneâ, pilis sericeis quincuncialiter dispositis undique villosâ; spirâ anfractibus sex convexis, ultimo abnormaliter crescente, et ponè labrum valdè contracto; aperturâ angustâ, lunatâ, labro albo, latè revoluta; fauce lividâ.

SYNONYMS AND REFERENCES.

Helix labiosa, GOULD, Proc. Bost. Soc. Nat. Hist. II. 165, Aug. 1846.

Expedition, Shells, p. 16.

PFEIFFER, Monog. Helic. Viv. I. 343.

DESCRIPTION.

ANIMAL slender, tentacles much elongated. Color pale ferruginous, with a lilac tint, darker on the neck. Whole surface, even the tentacles, marked with coarse, elliptical granules, in longitudinal series; no marginal border.

SHELL depressed, about equally convex above and beneath, with a very small umbilicus partially covered by the lip; yellowish horn-color. The epidermis is strong, and everywhere hispid with very fine, short, shining hairs, closely arranged in lozenge, so that the principal lines seem to run diagonally to the axis of the shell. When denuded of the hairs, the lines of growth are found to be scarred, at regular distances, with transverse elevations, on which the hairs were seated. Whorls six, the last one increasing very rapidly near the aperture, having nevertheless a deep constriction directly behind the lip. Aperture more than usually vertical, narrow lunate. Lip white, widely reflected, flexuous in its course, not decidedly flattened. Throat pale violet or slightly livid.

Diameter over three-fifths of an inch; axis two-fifths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Oregon, at Astoria and Fort George, on the Columbia River, by the naturalists of the U. S. Exploring Expedition.

REMARKS. This, like the preceding, is another shell

from beyond the Rocky Mountains, corresponding in type to species of the Atlantic slope. It is closely allied to *H. palliata*, but is smaller, more convex, and lacks the columellar tooth. It is still somewhat doubtful if it be really distinct from *H. columbiana*, which may possibly have been described from small, denuded specimens; but I cannot, with a magnifier, discover on Mr. Lea's specimens, the papillæ on which hairs might have been situated, and which are so readily seen in this species. The lip is also considerably broader, and peculiarly flexuous.—[G.]

34. *HELIX MOBILIANA*, LEA.

PLATE XLII. FIGURE 2.

H. testâ parvâ, sub-globosâ, arctè perforatâ, rufo-carneâ, glabrâ; spirâ depressâ, anfractibus senis convexis; aperturâ rotundatâ, lunatâ; labro reflexiusculo; basi convexâ.

SYNONYMS AND REFERENCES.

Helix mobiliana, LEA, Proc. Amer. Philos. Soc. II. 82, anno 1841.

Trans. Am. Philos. Soc. N. S. IX. 17.

PFEIFFER, Monog. Helic. Viv. I. 323.

DESCRIPTION.

ANIMAL not observed.

SHELL sub-globose; epidermis corneous, nearly smooth; spire rather prominent; suture impressed; whorls rather more than five, the last ample; striæ of increase hardly visible; lip white, very narrow, reflected, a deep groove behind it; aperture well rounded,

semi-circular, considerably contracted by the impressed groove behind the lip, and a corresponding testaceous deposit, or rib, within; umbilicus small, round, not expanded; umbilical region not impressed; base convex.

Transverse diameter five-sixteenths of an inch; ordinarily considerably less.

GEOGRAPHICAL DISTRIBUTION. It was found by Mr. Charles Lea in the vicinity of Mobile, Alabama. Specimens have been received by me from J. H. Couper, Esq. from near Darien, Ga.

REMARKS. The above description applies to the mature shell only. A great part of the specimens have the aperture in a much less developed condition,—the lip being acute, or the reflection but partly completed, and the depression behind the lip not visible. The color of the aperture, in some recent specimens, is delicately roseate. The general aspect of this species is somewhat like that of a *Helicina*. It is a pretty, and very distinct species.

35. HELIX SAXICOLA, PFEIFFER:PLATE XXIX. *a.* FIGURE 4.

H. testâ depresso-conicâ, tenui, brunneâ, obliquè striatâ, umbilicatâ; anfractibus quatuor cum dimidio arcu spiratis; labro acuto, tenui; aperturâ orbiculari, campanulatâ.

SYNONYMS AND REFERENCES.

Helix saxicola, PFEIFFER, Wieg. Archiv. 1840, I. 251.

Monog. Helic. Viv. I. 87.

Helix mauriniana, D'ORB. in Sagra's Cuba, I. 162, t. 8, f. 20 - 23.

DESCRIPTION.

SHELL minute, planorboid, smooth, horn-colored; spire slightly elevated, composed of four or five well-rounded whorls separated by a deeply impressed suture; beneath, with a broad, umbilical pit, one-third the diameter of the shell, exhibiting all the whorls within. Aperture circular, being but slightly impinged upon by the penult whorl, across which passes a slightly appressed scale of enamel, rendering the lip continuous; lip slightly reflexed, so as to render the aperture somewhat campanulate.

Diameter about one-eighth of an inch; height about half as much.

GEOGRAPHICAL DISTRIBUTION. Found at Galveston, Texas, by Mr. Bartlett, but was probably introduced from Cuba, where it appears to be not uncommon.

REMARKS. This shell might at first be taken for a

small Planorbis, rather than a Helix. It is closely allied to *H. rupestris* of Europe, but is somewhat larger. It bears a closer resemblance to *H. lineata* than to any other North American species. Its circular, campanulate aperture, almost disconnected with the preceding whorl, is one of its most striking peculiarities.—[G.]

36. HELIX PULCHELLA, MÜLLER:

PLATE XVII. FIGURE 1.

H. testâ minutâ, orbiculato-depressâ, umbilicatâ, albâ ; anfractibus quatuor ; aperturâ circulari ; labro crasso, albo, margine reflexo.

SYNONYMS AND REFERENCES.

Helix pulchella, MÜLLER, loc. cit. 30, No. 232.

BINNEY, Bost Journ. Nat. Hist. III. 375, pl. 9, f. 2.

GOULD, Invertebrata, 176, f. 102.

ADAMS, Vermont Mollusca, 9.

Silliman's Journ. XLI. 272.

Helix minuta, SAY, Nicholson's Encyc. ; Journ. Acad. I. 123.

KIRTLAND, Ohio Report, 173.

DE KAY, New York Report, 31.

Nat. Hist. New York, p. 40, pl. 3, f. 33, a. b.

DESCRIPTION.

ANIMAL whitish, semi-transparent.

SHELL depressed, slightly convex above, thin, and transparent ; epidermis colorless ; whorls four, very minutely striated, the last large, and spreading at the mouth like a trumpet ; aperture orbicular, a little dilated ; lip much thickened, white, reflected, making

nearly a continuous circle; umbilicus large, exhibiting all the volutions.

Extreme transverse diameter one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Atlantic States from Maine to South Carolina, and from Vermont to Council Bluffs on the Missouri. It is common in the neighborhood of Boston, and so common in Vermont that Prof. Adams states that he has taken eleven hundred in an hour.

REMARKS. I have recently received from Dr. Griffith specimens with the raised striæ, or parallel ribs, taken in gardens in Philadelphia. It is the variety which Müller described as *Helix costata*.

Though very minute, it is a beautiful species; and its form, which is seen to most advantage by the aid of a magnifying glass, resembles very much that of *Cyclostoma volvulus*. It is commonly found under stones. It is thought by some to have been introduced from Europe; but I am of opinion that it is a native species. It does not seem possible that so small an animal, if naturalized near the sea-shore since the arrival of Europeans, should have been able to penetrate to the remote points in the interior of the continent where it is now found.

d. Aperture toothed.

37. HELIX PROFUNDA, SAY.

PLATE XXII.

H. testâ orbiculato-depressâ, latè umbilicatâ, luteo-corneâ, lineis fuscis cinctâ; anfractibus striatis, striis confertis obliquis; aperturâ orbiculari; labro albo, ad basim sub-unidentato; margine reflexo.

SYNONYMS AND REFERENCES.

Helix profunda, SAY, Journ. Acad. II. 160, anno 1821.

American Conchology, No. 4, pl. 37, f. 3.

Ed. Chenu, pl. 13, f. 2 b. 2 c.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Boston Journ. Nat. Hist. III. 377, pl. 15.

CHEMNITZ, 2 ed. tab. 77. f. 14-16.

PFEIFFER, Monog. Helic. Viv. I. 382.

Helix Richardi, FÉRUSAC, Tab. Syst. 43; Hist. pl. 70, 3 lower figs.

LAMARCK, loc. cit. VI. 72.

DESHAYES, Encyc. Meth. II. 212; in Lamarck, VIII. 40.

DESCRIPTION.

ANIMAL light brown, darker on the head, neck, and tentacles, and pale on the posterior extremity; foot rather thick, in length less than twice the diameter of the shell, terminating acutely.

SHELL depressed-convex; epidermis yellowish horn-color, with reddish-brown, revolving lines and bands; whorls from five to six, convex, obliquely striated with delicate and regular raised striæ; suture distinct; aperture almost circular, a little contracted by the lip,

flattened towards the plane of the base; lip white, reflected, with a slightly prominent callus, or obtuse tooth, on the inner edge near the base; umbilicus rather large and profound, exhibiting all the volutions to the apex; base convex, with the striæ converging into the umbilicus.

Greatest transverse diameter one inch and one-eighth.

GEOGRAPHICAL DISTRIBUTION. Inhabits the banks of the Ohio, Mississippi, and Missouri Rivers; has been observed on the latter as high as Council Bluffs. Found also in the western parts of New York, Pennsylvania, and Virginia, and in Tennessee.

The most eastern locality which I have heard of, is near the mouth of the Juniata River in Pennsylvania, where it was noticed by Dr. Griffith.

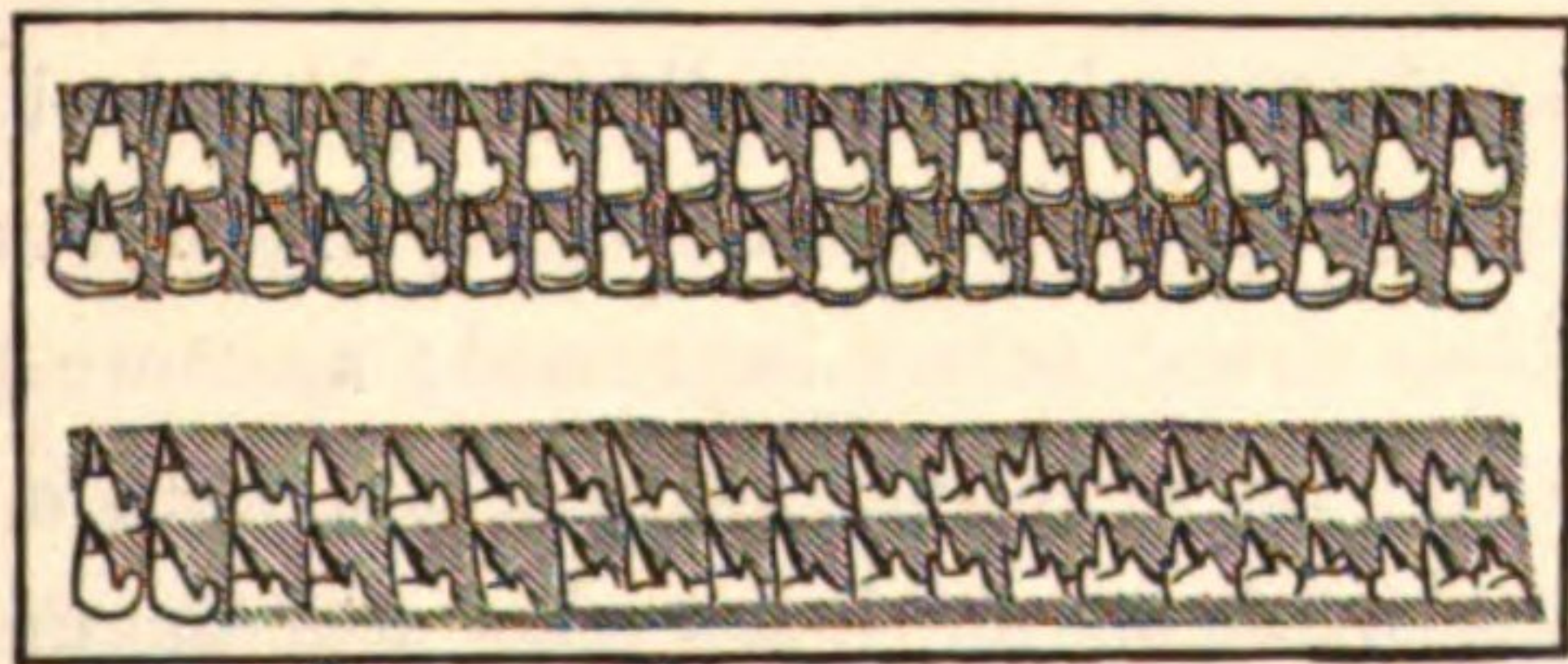
REMARKS. This is one of our most remarkable shells, by reason of its reddish-brown bands and lines. There is usually one band, on the upper side of each whorl, wholly visible on the body-whorl, and partially concealed on the spire, while on the lower part of the shell there are numerous fuscous lines. In some instances the broad band is deficient; in others, the lines, and occasionally the rufous coloring, extend over the whole shell, leaving only one or two lighter bands. Specimens are not uncommon of a uniform, pale horn-color, without bands or lines. The superior and inferior extremities of the lip approach each other at their junction with the body-whorl, leaving only a small space of the whorl

between them, and rendering the aperture almost circular; a thin, whitish callus sometimes completes the union. The tooth is wanting in immature shells.

Mr. Say's "description of this shell was published in the year 1821. Lamarck's description of *H. Richardi* did not appear until April, 1822; but he quotes by anticipation *Férussac, Hist. Nat. des Moll. No. 174*, for the specific name; which, however, was not then published in that work, but appeared in the *Tableau Systématique* of that author, in the earlier part of the same year. The name of *profunda* has therefore the priority, and consequently must be adopted."

These are Mr. Say's words, extracted from his *American Conchology*, No. 4.

This species seems to represent, in America, the group of which *H. cingulata* is the type in Europe. The principal difference consists in the little, tooth-like callus which our shell has upon the lip, and the more numerous bands.



38. *HELIX SAYI*, BINNEY.

PLATE. XXIII.

H. testâ orbiculato-depressâ, tenui, luteo-corneâ, profundè umbilicatâ ; anfractibus tenuiter striatis, striis confertis, obliquis ; aperturâ rotundatâ ; labro albo, margine angustè reflexo, ad basim unidentato ; columellâ dente unico albo, exiguo, armatâ.

SYNONYMS AND REFERENCES.

Helix diodonta, SAY, Exped. St. Peter's, II. 257, pl. 15, f. 4.

KIRTLAND, Ohio Report, 173.

DE KAY, New York Report, 31.

DESHAYES in Contin. Férussac, pl. 69, i. f. 2, an. 1820.

Helix Sayi, BINNEY, Bost. Journ. Nat. Hist. III. 379, pl. 16.

ADAMS, Vermont Mollusca, 10.

PFEIFFER, Monog. Helic. Viv. I. 382.

DESCRIPTION.

ANIMAL light reddish-brown, tentacles smoky, eyes black ; head and neck cylindrical, foot narrow, terminating in an acute point ; length about twice the diameter of the shell.

SHELL depressed, convex, thin ; epidermis light russet, shining ; whorls between five and six, with numerous fine, oblique striæ ; suture impressed ; aperture rounded, not dilated ; lip white, narrow, reflected, with a slightly projecting tooth on the inner edge near the umbilicus ; columella with a sub-prominent, white tooth ; umbilicus open, deep, not wide, exhibiting all the volutions, slightly contracted by the reflected lip ; base rounded, with the striæ distinct, converging into the umbilicus.

Transverse diameter commonly less than one inch; but there are specimens in the Philadelphia Museum, from Mr. Hyde's collection, measuring one inch and three-quarters.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the northern parts of the United States, from Illinois to Maine. Is rather common on the slopes of the Green Mountains, in Vermont.

REMARKS. This is a handsome species, with a delicate, shining epidermis. It is not likely to be taken for any other species, except *H. profunda*, Say, from which it is distinguished by its inferior size and solidity, its narrow lip and less circular aperture, the absence of the brown lines and bands, and the presence of the tooth on the pillar-lip. It varies in the greater or less depression of the spire, and is sometimes destitute of the tooth on the pillar-lip.

On the third day of July, 1836, I discovered an individual of this species in the act of laying its eggs in a damp place under a log. I transferred them, with the animal, to a tin box filled with wet moss. The eggs were not much more than half as large as those of *H. albolaris*, Say; they were white, adhering together very slightly, flaccid, and apparently not entirely filled with fluid. During the succeeding night the number had increased to about fifty, and in a few hours they became full and distended. As the snail now began to devour the eggs, I was obliged to remove it. On the twenty-

ninth of July, all the eggs were hatched: the young snails had one whorl and a half; the umbilicus was open; the head and tentacles were bluish-black, and the other parts whitish and semi-transparent. They immediately began to feed, and made their first repast of the pellicle of the eggs from which they had just emerged. They grew rapidly, and before the middle of October, when they went into winter quarters, they had increased their bulk four or five times beyond its original measurement.

Mr. Say published his description of this species, under the name of *H. diodonta*, in 1824; but that specific name seems to have been preoccupied for a very different shell, (See *Lamarck, Anim. sans Vert. 2d. ed. VIII. 116,*) and is now recognized by several authors as applied to a species established by Von Muhlfeld. It is proper, therefore, to adopt a new name. I propose that of Sayi, in honor of THOMAS SAY, the describer of the greater part of our land shells. I am aware that the use of proper names for this purpose has been so much abused, that such an application might no longer be considered a compliment by a living naturalist; but Mr. Say's reputation is too well established to suffer by his name being mingled with those of the great crowd of known and unknown persons to whom a similar honor has been offered.

39. **HELIX TRIDENTATA, SAY.**

PLATES XXVII. XXVIII.

H. testâ depressâ, profundè umbilicatâ, corneo-rufescente ; anfractibus striatis, striis distinctis, crebris, obliquis ; aperturâ contractâ, trilobatâ ; labro albo, reflexo, dentibus duobus instructo ; columellâ dente albo sub-arcuato armatâ.

SYNONYMS AND REFERENCES.

- Helix tridentata*, SAY, Nich. Encyc. IV. pl. 2, f. 1.
 FÉRUSSAC, Tab. Syst. 38 ; Hist. pl. 51, f. 3.
 WOOD, loc. cit. Supplem. pl. 7, f. 2.
 DESHAYES, Encyc. Meth. II. 213.
 in Lamarck, VIII. 115.
 KIRTLAND, Ohio Report.
 SAGER, Michigan Catalogue.
 BINNEY, Boston Journ. Nat. Hist. III. 382, pl. 17 & 18.
 DE KAY, New York Report, 31.
 ADAMS, Vermont Mollusca, 10.
 GOULD, Invertebrata, 173, f. 115.
 CHEMNITZ, 2d ed. pl. 10, f. 7, 8.
 PFEIFFER, Monog. Helic. Viv. I. 412.
- Helix fallax*, SAY, Journ. Acad. II. 119.
 CHEMNITZ, 2d. ed. pl. 64, f. 7-9.
 PFEIFFER, Monog. I. 412.
 KIRTLAND, SAGER, DE KAY, *ut supra*.

DESCRIPTION.

ANIMAL dark bluish slate color, deeper on the head and tentacles ; length of superior tentacles about a quarter of an inch ; foot narrow, equal in length to nearly twice the diameter of the shell, terminating in an acute angle.

SHELL depressed, a little convex ; epidermis varying from light corneous, or russet, to chestnut ; whorls four

and a half to six, crossed obliquely by numerous acute, raised lines ; aperture trilobate, more or less contracted by a groove behind the lip ; lip white, reflected, its outer contour rounded, furnished on its inner margin with two acute, projecting teeth ; pillar-lip with a white, projecting, slightly curved tooth placed obliquely in the aperture ; umbilicus open, deep ; base rounded, striæ converging into the umbilicus.

Greatest transverse diameter three-fourths of an inch ; common size less than half an inch.

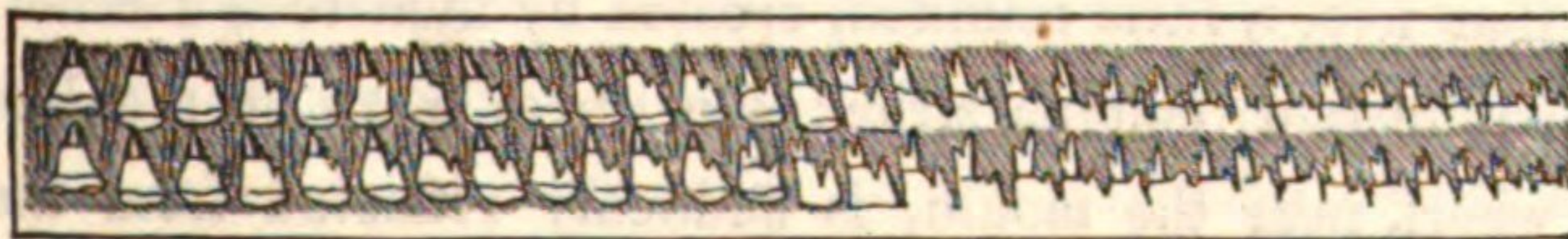
GEOGRAPHICAL DISTRIBUTION. Inhabits all the States. Common in forests in the interior, less frequent near the sea-coast.

REMARKS. This common and well-marked shell varies considerably in size. In the fertile sections of the Western States, it attains its largest diameter ; in Vermont it usually measures about half an inch, and on the sandy soil of Florida only a fourth of an inch in diameter. It varies also in the characters of the lip and aperture. In specimens from the North-eastern States, the lip is usually narrow, but slightly contracting the aperture, the teeth are but little prominent, and the spire is flattened, comprising less than five whorls. In those from the Western States, the lip is wider, the aperture more contracted, the spire more prominent, and the whorls comprise more than five volutions. But the most remarkable variety is that which Say considered distinct enough to form a separate species, under the name of *H. fallax*.

In this, the spire is more elevated, and sometimes has six full volutions. There is a deep groove behind the lip, contracting the aperture; the lip is widely reflected, and directed inwards, forming a basin-shaped mouth; the upper labial tooth is broader, sometimes bifid, and even trifid, and very much inflected; the columellar tooth extends quite to the base of the shell, and unites with the extremity of the lip; the aperture is nearly filled up by the teeth and the contraction of the lip. If this variety were to be seen alone, it would be adjudged to be a good species, and is generally so considered. Having examined a great number of every variety, from numerous localities, I have found every gradation between the extremes, and am convinced that they form but one species. The animals do not differ in the least degree.

Helix tridentata resembles *Helix palliata* on its upper surface, but differs from all others. The situation in which I have most commonly found it, is under the layers of wet and decaying leaves in forests; it is also found under flat stones. I have one specimen in which the direction of the whorls is reversed.

The figure of Férussac represents a very small shell, probably the southern variety. Lister's figure, tab. 92, figure 92, is probably intended for this shell.



40. *HELIX AURICULATA*, SAY.

PLATE XL.

H. testâ depressâ, subtus convexâ, corneo-rufescente; anfractibus striatis, striis distinctis, crebris, elevatis; aperturâ auriculatâ, angustissimâ, contortuplicatâ, ringente, marginibus connexis; columellâ plicâ reflexâ, dentiformi, in aperturam intrante; labro supra eminente, subtus ad basim appresso, internè bi-plicato; umbilico aperto.

SYNONYMS AND REFERENCES.

Polygyra auriculata, SAY, Nich. Encyc. IV.; Journ. Acad. I. 277.

Helix auriculata, FÉRUSSAC, Tab. Syst. 37; Hist. pl. 50, f. 3, 4.

DESHAYES in Lamarck, VIII. 112.

BINNEY, Boston Journ. Nat. Hist. III. 384, pl. 19, f. 1, 2.

CHEMNITZ, 2 ed. tab. 65, f. 3, 4.

PFEIFFER, Monog. Helic. Viv. I. 417.

Polygyra avara, SAY, Nich. Encyc. IV.; Journ. Acad. I. 277.

FÉRUSSAC, Tab. Syst. 37; Hist. pl. 50, f. 2.

Stenotrema avara, HARTMAN, Erd und Susswasser Gasterop. p. 84, tab. 22.

Helix Sayii, WOOD, loc. cit. Sup. pl. 7, f. 34. ?

DESCRIPTION.

ANIMAL longer than the breadth of the shell, acute behind, above granulated and blackish, beneath and each side white; upper tentacles long, slender, and tapering; lower ones short, and of nearly equal diameter.*

SHELL depressed, very slightly convex above, below convex; epidermis brownish horn-color; whorls more than five, a little rounded, crossed by numerous distinct, equidistant, oblique striæ; the upper part of the last whorl, near the mouth, is suddenly reflected from the

* Say, in Nicholson's Encyclopedia, American edition, Vol. IV.

preceding whorl, and turned outwards, having a sharp carina on its inner edge; the lower part is slightly reflected, but attached; lip projecting at the upper part, somewhat reflected in the middle, and appressed to the whorl and indented below; pillar-lip emarginate, strongly reflected, and pressed upwards into the aperture in an acute angle; aperture ear-shaped, throat very narrow, with a lamellar fold or tooth within above, and another more external below, with a deep sulcus between them; umbilicus open, carinated and grooved on the last whorl, exhibiting nearly two volutions.

Greatest transverse diameter more than half an inch.

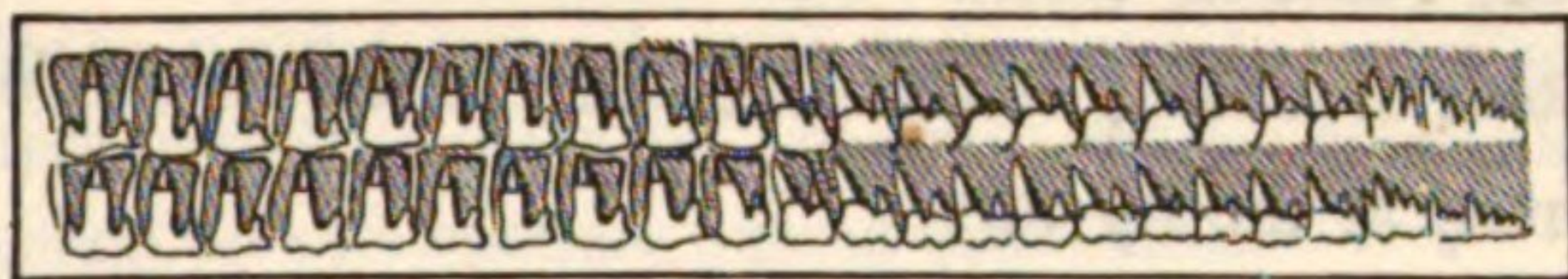
GEOGRAPHICAL DISTRIBUTION. Inhabits Georgia and South Carolina, near the coast, and Florida; common near St. Augustine and at various places on St. John's River; it has also been found at Natchez.

REMARKS. This is one of several curious species which were discovered by Mr. Say in Florida, and of which he formed the genus *Polygyra*, so called from the numerous whorls of some of them. The animal does not appear to differ from that of *Helix*; and, as mere peculiarities in the shell are not recognized as sufficient for the subdivision of genera, his distinction has not obtained. Mr. Say gives a separate measurement of males and females, from which it would seem that he considered the animals to be unisexual; a distinction which, if correct, would effectually separate it from *Helix*, the animal of which, in every case, combines both sexes in

the same individual. I have had occasion to notice considerable numbers of the animal of *Polygyra septemvolva*, Say, but have not observed any fact which would tend to confirm such an opinion. On the contrary, it has appeared to me that they were analogous in all respects to the animals of the genus *Helix*.

This shell is peculiar for the complicated form of its aperture, which bears a considerable resemblance to the human ear. In mature individuals the lip is very much projected, the folds within the aperture are prominent, and the aperture greatly contracted. The laminated folds within are marked by corresponding depressions externally, behind the reflection of the lip. At different periods of growth the aperture differs very much in appearance, and has led naturalists into error. When the lip is just beginning to be formed, and as yet projects but little, there are two projecting teeth on its inner edge, with a deep sulcus between them; as these continue to grow, they assume more and more the appearance of lamellar folds, the lower one of which, when viewed on a line perpendicular to the base of the shell, hides the other. The columellar fold, at the same early period, appears more like an independent tooth, to each extremity of which the lip is connected. It is this variety which Mr. Say described as a distinct species, under the name of *Polygyra avara*. This opinion I derive not so much from his descriptions as from the examination of original specimens collected and labelled by him, now in my possession. I have specimens of the mature shell

smaller than any specimen of *H. avara* that I have seen, and have other specimens of *H. avara*, so called, as large as the most mature *H. auriculata*. Plate XL. figure 1, represents the mature shell; figure 2, the young shell, described by Say as *P. avara*.



41. HELIX VULTUOSA, GOULD.

PLATE XL. *a*. FIGURE 4.

H. testâ orbiculari, utrinque convexiusculâ, rufo-corneâ, latè umbilicatâ, confertim striatâ: spirâ depressâ, anfractibus 5½ convexis, ultimo ad peripheriam subangulato: aperturâ lunari; labro albo, crasso, tortuoso, dente basali, marginali, falcato, et dente mediano, obliquo, profundo, armato; lamellâ columellari obliquâ, arcuatâ, erectâ, nisi infrâ ad labrum junctâ.

SYNONYMS AND REFERENCES.

Helix vultuosa, GOULD, Proc. Bost. Soc. Nat. Hist. III. 39, anno 1848.

DESCRIPTION.

SHELL orbicular, depressed, about equally convex on both sides, rather solid, dark horn-color, delicately striated; spire a low dome, composed of about five and a half whorls, which are moderately convex, and separated

by a well-defined suture, the exterior one somewhat angular at periphery. Beneath, well rounded, and perforated by a deep umbilicus, about one-fourth as broad as the base. Aperture rather large, lunate; lip moderately reflexed, tortuous, white, having at the base a small tooth, and at the centre a deep seated, more expanded, reflexed tooth. The columella bears a stout, elevated, arcuated, oblique lamella, joined to the lower extremity of the lip only.

Diameter two-fifths of an inch, axis one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found by Mr. Bartlett in Texas, near Corpus Christi and Galveston.

REMARKS. At first glance this might be regarded as an immature form of *H. inflecta*. It is generally smaller and more convex, has a narrower aperture more nearly closed by the pillar-tooth, the basal tooth is more developed, and the median one is deeper seated, and remarkably directed backwards into the aperture. From *H. Texasiana*, it differs in having an open umbilicus, and by having no line of callus connecting the pillar-tooth with the upper angle of the lip, thereby forming a reëntering angle. It is, in truth, intermediate between *H. fallax* and *H. Texasiana*.—[G.]

42. **HELIX TEXASIANA**, MORICAND.

PLATE XLV. FIGURE 1.

H. testâ orbiculato-depressâ, corneâ, supernè planulatâ, sulcato-striatâ, ad peripheriam angulatâ, infernè convexâ, glabrâ, nitidâ, arctè perforatâ; anfractibus quinis, ultimo deflecto, ponè labro albo reflexo constricto; aperturâ coarctato-lunari, labro infernè bidentato, extremitatibus lamellâ angulatâ ad collumellam adnatâ coadunatis.

SYNONYMS AND REFERENCES.

Helix Texasiana, MORICAND, Mem. Genev. VI. 538, pl. 1, f. 2.

DESHAYES, ed. Lamarck, VIII. 133.

FÉRUSAC, Hist. des Moll. pl. 69, D. f. 2.

Helix auriculata, BINNEY, Boston Journ. Nat. Hist. III. 387.

DESCRIPTION.

ANIMAL brownish, or dingy white; tentacles darker, sheaths visible by a dark line, superior tentacles much enlarged at tip.

SHELL depressed, orbicular, rather solid, of a pale horn color, with crowded rib-striæ above, smooth, or faintly striated, and shining beneath. Spire nearly flat, of five whorls separated by a well-marked suture, the outer one obtusely angular at periphery, nearly at the plane of the spire, and somewhat deflected near the aperture. Beneath convexly rounded, with a somewhat distorted appearance in consequence of the whorl becoming narrower, rather than broader, towards the aperture, leaving a minute umbilical perforation. Aperture nar-

row lunate, the lip forming about two-thirds of a circle, reflected, white, with a constriction behind it, and armed with two denticles at its inner edge, one near the centre, the other at the middle of the basal portion. The extremities of the lip are connected by a callus across the columella, of an acutely angular form, pointing to the middle of the portion of the lip above the upper denticle, the lower ramus of the angle being longest and largest, and a little concave inwardly.

Diameter three-eighths of an inch, axis three-twentieths of an inch.

GEOGRAPHICAL DISTRIBUTION. Collected by Mr. Bartlett at Corpus Christi, and Galveston, in Texas.

REMARKS. The numerous specimens now in our possession render the specific value of this shell no longer doubtful. In the monograph in the Boston Journal of Natural History, it was regarded as a form of *H. auriculata*; and M. Férussac (Bulletin Zoologique, 2d section, 85,) referred it to the next species. In the former, even in the immature stage, all the oral appendages are more lamellar, and are not appressed to the shell; in the mature state, the development of the lip admits of no mistake. It is larger, thinner, and smoother, both above and below. *H. fatigiata* is smaller, more discoidal, the teeth on the outer lip are deeper within the throat, and the triangular lamella on the columella is obliquely truncated at tip, so as to render it linguiform. *H. pustula* is still smaller, and has a very different umbilicus. In

H. Texasiana the columellar lamella goes off more directly from the lower junction of the lip, leaving no intervening channel. Dr. Pfeiffer seems also to have made still greater confusion, in his *Monographia*, by regarding it as identical with the *plicata* and *auriculata* of Say, which he places as synonyms under Moricand's species, while he makes a distinct species of *H. Troostiana*, Lea. It is impossible, indeed, to say which species he actually had under his eye when he made his description; and, indeed, so far as may be made out from the description, his *H. ventrosula* accords with the true *Texasiana*.—[G.]

43. HELIX FATIGIATA, SAY.

PLATE XXXIX. FIGURES 2, 4.

H. testâ subplanulatâ, umbilicatâ, luteo-corneâ; anfractibus striatis, striis distinctis, crebris, elevatis; aperturâ suborbiculari, contractâ; labro albo, reflexo, intus bidentato; columellâ plicâ, sub-acutâ, in medio aperturæ projectâ.

SYNONYMS AND REFERENCES.

Helix fatigiata, BINNEY, Boston Journ. Nat. Hist. III. 388, pl. 19, f. 3.

Helix Troostiana, PFEIFFER, Monog. Helic. Viv. I. 419.

Polygyra plicata, SAY, Nich. Encyc. IV.; Journ. Acad. II. 161.

Polygyra fatigiata, SAY, Disseminator, &c.

Polygyra Dorfeuillana, LEA, Am. Phil. Trans. VI. 107, pl. 24, f. 118.

KIRTLAND, Ohio Report, 173.

Polygyra Troostiana, LEA, loc. cit. VI. 107, pl. 24, f. 119.

DESCRIPTION.

ANIMAL not hitherto noticed.

SHELL plane above, or a little convex; epidermis light

russet; whorls more than five, with numerous raised, oblique, equidistant striæ; aperture shaped like a horse-shoe; lip equally reflected, regularly arcuated, describing two-thirds of a circle, with a depression behind its reflection; within the aperture, on the outer side of the whorl, are two prominent, white teeth, the lower near the base conical, the upper more compressed and placed farther within; columella with an oblique tooth or fold projecting towards the centre of the aperture, and connected by slightly raised, curved lines of callus with the superior and inferior extremities of the lip; base of the shell showing about one and a half volutions of the spire.

Greatest transverse diameter more than one-third of an inch, common size less than one-fourth.

GEOGRAPHICAL DISTRIBUTION. Found hitherto in Illinois, Ohio, Georgia, Alabama, Florida, Kentucky, Tennessee, and Texas. Though not common, it seems to be a widely spread species.

It is oftenest found in the States bordering upon the Gulf of Mexico.

REMARKS. This peculiar and interesting shell has been hitherto rare in collections, and is therefore but little known. Some specimens are entirely flat on the upper surface, in some the striæ of the whorls are distinct on the upper and lower surfaces, in others only on the upper, leaving the lower surface smooth. The outer whorl is occasionally carinated. The aperture is usually

shaped like a horseshoe. The teeth within the aperture might escape notice if not looked for. The columellar tooth varies considerably, being in some thin and oblique, connected by delicate lines of callus at either extremity with the lip, in others larger and more prominent, with the space between the two lines of callus more or less filled up with testaceous matter.

There is a variety with the upper surface flat, the striæ of increase very prominent and sharp, and more widely separated, six entire whorls, acutely carinated, the base exhibiting one and a half volutions and a deep umbilicus. This, by some, would be considered a distinct species; but it does not seem to me to be entitled to any other rank than that of a marked variety.

This species was first described by Mr. Say, as *Polygyra plicata*. A variety, differing in some slight particulars, but found at a point very remote from the first, was described by him as *Polygyra fatigiata*. Recently, Mr. Lea has enlarged its synonymy by the addition of two new specific names. The distinctions on which the latter has founded his species, in this instance, are not, I think, sufficient for that purpose; if admitted to be valid, they would lead to an infinite multiplication of species, and burden the descriptive part of Natural History with a mass of matter beyond the compass of any mind.

Having in my possession original specimens of *Polygyra plicata* labelled by Mr. Say, and having, through the politeness of Mr. Lea, had the opportunity of examining the specimens from which he made his descriptions

of *Polygra Dorfeuillana* and *Troostiana*, the opinion which I derived from his descriptions and figures has been confirmed, and I cannot doubt the specific identity of the three. There is, however, much difficulty in identifying specimens of Mr. Say's *Polygyræ*: they vary much in size, at maturity; and the younger shells differ from the older, in a remarkable manner, in the character of the aperture.

The original specific name, *plicata*, being preoccupied in this genus, I have adopted Mr. Say's second name, *fatigiata*.

44. *HELIX SEPTEMVOLVA*, SAY.

PLATE XXXVIII. XXXIX. FIGURE 1.

H. testâ orbiculari, discoideâ, umbilicatâ, corneâ; anfractibus numerosis, obliquè et acutè striatis; aperturâ ab axe remotâ, sub-orbiculari, marginibus connexis; columellâ unilamellatâ; labro albido, margine reflexo.

SYNONYMS AND REFERENCES.

Helix septemvolva, SAY, Journ. Acad. I. 278, anno 1818.

Nich. Encyc. IV.

BINNEY, Boston Journ. Nat. Hist. III. 391, pl. 19, f. 4.

FÉRUSAC, Tab. Syst. 38; Hist. pl. 51 B. f. 6.

WOOD, Index, Sup. pl. 7, f. 14.

DESHAYES, in Férussac, Contin. 5.

SOWERBY, Conch. Manual, 2d. ed. f. 275.

Helix planorbula, LAMARCK, VI. 89.

DESHAYES, Encyc. Meth. II. 208; in Lamarck, VIII. 67.

DELESSERT, Recueil, tab. 26, f. 3.

Helix cereolus, PFEIFFER, Monog. Helic. Viv. I. 408.

DESCRIPTION.

ANIMAL brownish, tentacles darker, very long and

slender, eyes black; foot narrow, thin, semi-transparent, receiving its color, in some degree, from the substance on which it is placed, not projecting behind the shell when in motion; length less than twice the breadth of the shell, which it carries nearly horizontally.

SHELL discoidal, sub-carinated; epidermis corneous; whorls from less than six to more than eight, narrow, compressed, diminishing very gradually in width from the aperture to the apex, with raised, acute, transverse lines, which are nearly obsolete on the base; lip commonly white, continuous round the aperture; outer lip reflected, with a groove behind the reflection, regularly rounded so as to describe two-thirds of a circle; pillar-lip with an acute fold, or tooth, projecting towards the aperture; base showing from two to four volutions in the same plane, with a moderate umbilicus, extending to the apex.

Greatest transverse diameter nearly five-eighths of an inch, commonly much less.

GEOGRAPHICAL DISTRIBUTION. Inhabits Georgia, Florida, Alabama, and Texas. Very common on the Sea Islands. I noticed immense numbers of them on a small island in St. Joseph's Bay, Florida, under the decaying leaves of the palmetto, in company with *Helicina orbiculata*.

REMARKS. The compressed, discoidal shape of this shell, and its numerous narrow whorls revolving around

their axis in the same plane, serve to distinguish it from other species. It varies in being occasionally a little convex, more or less carinate, and in exhibiting a greater or less number of full volutions on the base.

The reflected lip in this shell seems to be formed at various periods of growth, thus creating a greater diversity of size in the apparently mature shell than exists in any other species. From the nucleus until the accomplishment of five full whorls, each whorl on the base is curved a little lower than that which precedes it; and up to this time, consequently, the umbilicus is deep and gradually expanding, exhibiting, when carefully examined, all the volutions. Up to this period, also, the spire is almost always prominent. After five whorls are completed, the succeeding ones usually follow in the same horizontal plane, and give a discoidal character to the shell. It is manifest, therefore, that specimens in each of these stages must present considerable differences; and, accordingly, the small, delicate shell, having a slightly convex spire of five whorls, a deep umbilicus, and a transverse diameter of only one-eighth of an inch, forms a beautiful variety, and has been thought to be a distinct species.

The name *planorbula* was applied by Lamarck, in defiance of received rules of nomenclature, as his references show that he knew that another specific name was already in use. It seems probable that this shell was first described by Megerle, in the Berlin Magazine, 1816, as *H. cereolus*; but as both his description and

figures are said by Deshayes to be indefinite, the benefit of the uncertainty is given to Mr. Say's name.

I have seen specimens of this shell which were said to be brought from one of the West India islands. It is very probable that this, as well as other species, is common both to the peninsula of Florida and the nearest islands of the Gulf of Mexico.

45. **HELIX LEPORINA**, GOULD.

PLATE XL *a*. FIGURE 1.

H. testâ parvâ, lenticulari, rufo-corneâ, pilosiusculâ, leviter striatâ, vix perforatâ ; spirâ depressâ, anfractibus quinis convexiusculis, ultimo supernè subangulato ; aperturâ lunatâ, labro incumbente, reflexo, roseo, dentibus duobus sinu disjunctis instructo ; lamellâ columellari obliquâ, erectâ, acutâ, rectangulari, callo lineari supernè ad angulum aperturæ junctâ.

SYNONYMS AND REFERENCES.

Helix leporina, GOULD, Proc. Bost. Soc. Nat. Hist. III. 39, anno 1848.

DESCRIPTION.

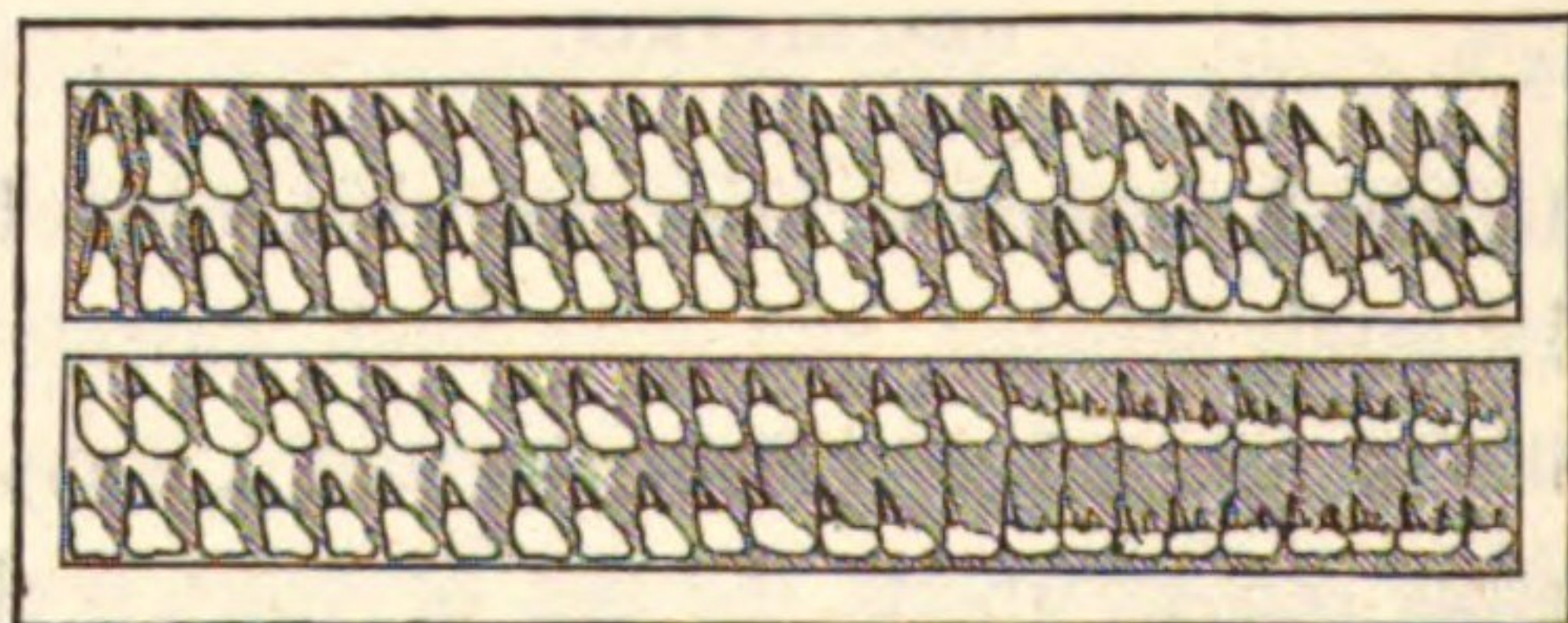
SHELL small, depressed, orbicular, thin, reddish horn-color, delicately striated, and when fresh, having a delicate down on its surface. Spire depressed, composed of five slightly convex whorls, the last of which is obtusely angular at its upper portion. The base is convex, excavated at the umbilical region, with a minute perforation. Aperture lunate, the lip incumbent, rose-colored, reflexed, bearing on its inner edge two expanded teeth

separated by a deep, narrow fissure. On the columella is a quadrate, erect, oblique lamella, its upper edge joined to the upper angle of the aperture by a threadlike callus.

Diameter one-fifth of an inch, axis one-eighth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found by Mr. Bartlett in Mississippi and Arkansas.

REMARKS. This pretty little shell is intermediate between *H. hirsuta* and *H. inflecta*, though smaller than either. It is less globose than *hirsuta*, while the aperture is much the same, except that the sinus of the lip is formed by the projection of two teeth instead of by an emargination, in this respect resembling *H. inflecta*. From the latter it differs in the columellar tooth. It resembles *H. pustula* still more; but the umbilical region is quite different.—[G.]



46. **HELIX PUSTULA**, FÉRUSAC.

PLATE XXXIX. FIGURE 3.

H. testâ parvâ, planorboideâ, corneâ, striatulâ; spirâ planulatâ, anfractibus quinis, convexis, arctè volutatis, suturâ benè discretis, ultimo subangulato; aperturâ coarctatâ, lunatâ, peristomate albo, reflexo, bilobato, marginibus dente obliquo linguiformi junctis; infra convexâ, latè umbilicatâ.

SYNONYMS AND REFERENCES.

Helix pustula, FÉRUSAC, Hist. Nat. des Moll. pl. 50, f. 1.

PFEIFFER, Symbolæ, III. p. 81. Monog. Helic. Viv. I. 422.

CHEMNITZ, 2d. ed. t. 65, f. 18-20.

DESCRIPTION.

SHELL small, planorboid, pale rufous or horn-colored, delicately striated. The spire is flat, has five closely revolving, rounded whorls, separated by a deep suture, the outermost obtusely angular at its upper limit; beneath convexly rounded into a large umbilicus, one-third the breadth of the base, and exhibiting the other whorls within, and with a constriction behind the lip. Aperture narrow, crescentic, the lip somewhat broadly reflected, white, its inner margin divided by a median fissure, from which it is narrowed each way, forming two dentiform lobes; on the columella is an erect lamella proceeding obliquely from below, its upper extremity being annexed to the upper extremity of the lip by a filiform callus.

Diameter one-fifth, axis one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found at Darien, and in Lee county, Georgia, and in Florida.

REMARKS. This rare species has hitherto been admitted with hesitation. In the Monograph in the Boston Journal, III. 390, it was noticed under *H. fatigiata*, without venturing to decide on its claims to a specific place. No doubt, however, can remain, after an examination of numerous specimens, the distinctive characters being found constant. It is smaller than *H. fatigiata*, its umbilical perforation is far broader than in any other of the polygyral group, and the sharp projecting inner edge of the lip is bisected by a fissure as in *H. hirsuta*. The columellar callus is much as in *H. fatigiata*.

47. HELIX LABYRINTHICA.

PLATE XVII. FIGURE 3.

H. testâ minutissimâ, sub-conicâ, apice obtuso, corneo-rufescente ; anfractibus striatis, striis eminentibus, obliquis ; labro incrassato, sub-reflexo ; umbilico minimo, impresso ; columellâ dente laminato in aperturam intrante.

SYNONYMS AND REFERENCES.

- Helix labyrinthica*, SAY, Journ. Acad. I. 124; Nich. Encyc. IV.
 KIRTLAND, Ohio Report, 173.
 BINNEY, Boston Journ. Nat. Hist. III. 393, pl. 26, f. 1.
 GOULD, Invertebrata, 184, f. 106.
 ADAMS, Vermont Mollusca, 10.
 FÉRUSSAC, Tab. Syst. 38; Hist. pl. 51, B. f. 1.
 PFEIFFER, Symbolæ, II. 31; Monog. Helic. Viv. I. 416.
 CHEMNITZ, 2d ed. t. 66, f. 17-20.

DESCRIPTION.

ANIMAL bluish black on the head, neck, and tentacles ; other parts lighter, base of foot whitish.

SHELL very minute, conic, apex obtuse; epidermis brownish horn-color; suture well impressed; whorls six, with conspicuous, elevated, obtuse, equidistant, oblique ribs; lip thickened, somewhat reflected; columella with a long, lamelliform, raised line, or tooth, which appears to revolve within the shell parallel to the suture, and sometimes a second, nearer to the base, less conspicuous, and terminating farther within the aperture; base flat; umbilicus small, impressed.

Greatest transverse diameter one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits a very wide range of territory; was noticed by Mr. Say in Missouri; is found in the Northern, Eastern, Middle, and Western States, also in Mississippi, Arkansas, and Texas.

REMARKS. This species is of about the same size as *H. rupestris*, Draparnaud, of Europe. It is very remarkable for the raised parallel laminae which revolve within the shell, terminating abruptly on the columella. Usually but one of them is apparent. When both are visible, their parallel arrangement bears some resemblance to the track of a railroad. The oblique striae on the whorls are very conspicuous. It varies much in the height of the spire, some specimens being very much flattened, others with a pointed apex; usually the spire is high and rounded at the apex. The aperture is moderate, not dilated, often delicately roseate, and sometimes reddish brown. Found in forests in the interstices of decaying logs, and under layers of wet leaves.

SECTION II. LIP SIMPLE.

e. Aperture destitute of teeth or folds within.

48. *HELIX LIGERA*.

PLATE XXXV.

H. testâ sub-globosâ, perforatâ, nitidâ, corneâ ; anfractibus septem, obliquè striatis ; aperturâ lunato-rotundatâ ; labro simplici, acuto ; basi propè aperturam albo, internè incrassato.

SYNONYMS AND REFERENCES.

Helix ligera, SAY, Journ. Acad. II. 157, anno 1821.

Exped. St. Peter's Riv. II. 258.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Boston Journ. Nat. Hist. III. 412, pl. 20, f. 1.

DE KAY, New York Report, 31.

CHEMNITZ, 2d. ed. pl. 33, f. 5-7.

PFEIFFER, Monog. Helic. Viv. I. 48.

Helix Rafinesquea, FERUSSAC, Tab. Syst. 50.

Hist. pl. 51, a. 5, pl. 50, a. f. 4, 5 ?

Helix Wardiana, LEA, Am. Phil. Trans. VI. 67, p. 23, f. 82.

DESCRIPTION.

ANIMAL uniform blackish slate-color over the whole upper surface, paler on the posterior extremity and base ; collar grayish-white ; foot narrow, exceeding in length twice the tranverse diameter of the shell.

SHELL sub-globose ; epidermis yellowish horn-color, shining ; whorls seven, finely and thickly striated transversely ; suture not much impressed ; aperture semilunate, rounded ; lip thin, acute ; base and side of the outer whorl, within the aperture, thickened and white ;

umbilicus very small ; umbilical region impressed. Greatest transverse diameter five-eighths of an inch, usually much less.

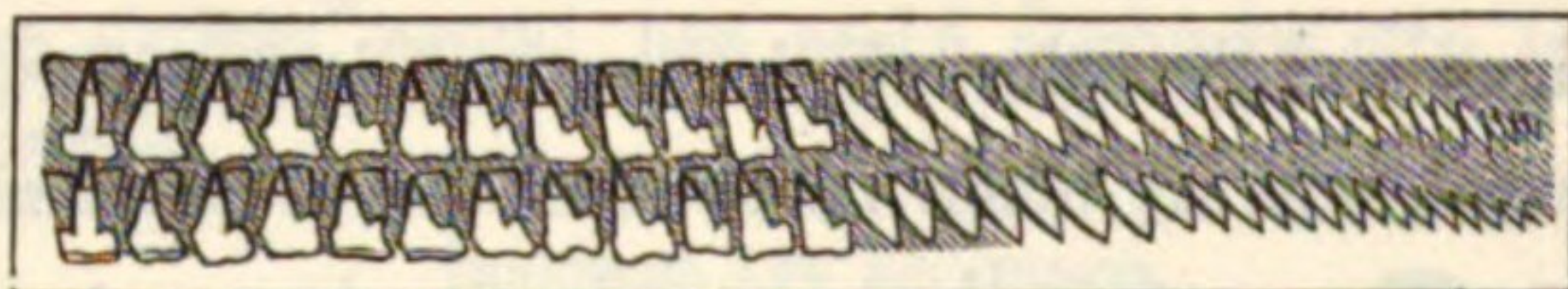
GEOGRAPHICAL DISTRIBUTION. Inhabits all the Western States, where it is common. It has been noticed also in Arkansas, and in the North-western Territory.

REMARKS. This species varies in the greater or less prominence of the spire, which sometimes is considerably depressed, and at other times rises into a sub-conical shape. The apex is, however, always obtuse, so that the young shells might be supposed to belong to another species, so different are they in shape from the mature shell. When fully grown, there are seven whorls complete, but usually the number does not much exceed six. The epidermis is commonly shining, and the oblique striæ are numerous and distinct. The young shells are pellucid. The base of the shell within the aperture is thickened with a very white callus, which is seen from without. The umbilicus is very small, and sometimes quite closed. The lip, at its junction with the base of the shell, is slightly reflected. *H. Wardiana* of Lea, is undoubtedly the young of this species. The distinction in the animal, noticed by Dr. Ward, was afterwards ascertained by him to be merely accidental.

Mr. Say's name should be retained for this shell, as his *description* was published several months before Ferrussac's *name* appeared, and several years in advance of his *figure*.

The species next succeeding is often considered to be only a variety of the present. The differences will be noticed in the remarks on that shell.

Lister's figure, tab. 81, f. 82, has been referred to as the representative of this species; but it is clearly too indefinite to be depended upon. It rather resembles the young of some of the larger species.



49. *HELIX INTERTEXTA*, BINNEY.

PLATE XXXVI.

H. testâ sub-pyramidatâ, perforatâ, corneâ; anfractibus striatis, striis obliquis, lineis minutissimis, impressis, volventibus, intertextis; anfractu ultimo zonâ sub-albidâ, rufo-marginatâ, cincto; aperturâ lunato-rotundatâ; labro simplici; basi intus incrassato.

SYNONYMS AND REFERENCES.

- Helix intertexta*, BINNEY, Boston Journ. Nat. Hist. III. 413, pl. 20, f. 2.
 PHILIPPI, Icon. II. 9, pl. 6, f. 16.
 CHEMNITZ, 2d. ed. pl. 33, f. 8-10.
 PFEIFFER, Monog. Helic. Viv. I. 49.

DESCRIPTION.

ANIMAL not hitherto observed.

SHELL sub-pyramidal; epidermis yellowish horn-color; whorls six to seven, with numerous fine, oblique striae, and very minute, spiral striae, intersecting each other;

outer whorl with a narrow, light-colored band, and an ill-defined, brownish band below it; aperture rounded, a little transverse; lip thin, somewhat thickened within by a deposition of testaceous matter, slightly reflected at its junction with the base of the shell; umbilicus small, sometimes nearly obsolete; base whiter than the upper surface.

Greatest transverse diameter about three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. It inhabits North Carolina. I have seen numerous specimens from Cabarrus County. It is also found in Ohio, Pennsylvania, and Maryland.

REMARKS. This shell resembles some varieties of *H. ligera* so nearly, that I hesitated some time before I considered it distinct. The spire is less high in a shell of the same size, has a smaller number of whorls, and is more pyramidal in shape than in that species. The diameter, in full-grown specimens, is greater, and the base is flatter. The epidermis is darker and less shining, the shell is thicker and less pellucid, the deposit of testaceous matter within the aperture is less. The size of the umbilicus and the shape of the aperture are the same in both. But the principal distinction consists in the spiral lines which revolve on the whorl, intersecting the striæ of growth, but so minute as hardly to be perceptible to the naked eye, yet present in every specimen which I have examined. The whitish, narrow band,

shaded below with rufous, apparent on the outer, and sometimes on the second whorl, generally aids in identifying it, though it is sometimes wanting. Young specimens are much more depressed than those of *H. ligera*, and are sometimes distinctly carinated. The depression of the umbilical region is not so evident in this as in the preceding species. The rufous band below the white band, is well defined and broad, in a single specimen before me.

50. *HELIX SOLITARIA*, SAY.

PLATE XXIV.

H. testâ crassâ, orbiculato-convexâ, latè umbilicatâ, corneo-rufescente, fasciis fuscis aut rufis cinctâ ; aperturâ circulari ; labro simplici ; basi unicolore.

SYNONYMS AND REFERENCES.

Helix solitaria, SAY, Journ. Acad. II. 157.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Boston Journ. Nat. Hist. III. 427, pl. 24.

CHEMNITZ, 2 ed. tab. 24, f. 5, 6.

PFEIFFER, Symbolæ, II. 39 ; Monog. Helic. Viv. I. 102.

Euryomphala solitaria, BECK, Index, 8.

DESCRIPTION.

ANIMAL. Dirty white, with a rufous tinge ; rufous spots on the head and neck, lighter ones along the margin. Tentaculæ dark ; foot short, posterior extremity rounded.

SHELL. Very convex, thick, apex obtuse ; epidermis varying from white to dark corneous, with revolving,

rufous bands, of which there are usually two on the body-whorl; whorls six, striated and rounded, the last whorl making a considerable part of the volume of the shell; suture distinctly impressed; aperture ample, nearly circular, space between the two extremities of the lip small, with a thin callus; within bluish white, showing the bands; umbilicus large and deep, exhibiting all the volutions; base destitute of bands.

Greatest transverse diameter more than one inch and a quarter.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States north of the Ohio river. It was noticed by Mr. Say in Lower Missouri.

REMARKS. This is a thick and coarse shell, when fully grown. It is distinguished by its coarse texture, deep and ample umbilicus, and the dark rufous bands on its whorls; but it is sometimes destitute of bands, and nearly white. The spire varies considerably in the degree of its elevation, but the apex is always obtuse. The same specific name was applied by Poiret to a French species, but, Draparnaud's name for the same shell (*H. conoidea*) having universally obtained, the present name can be retained for our species.



51. **HELIX STRIGOSA**, GOULD.

PLATE XXVI.

H. testâ orbiculari, depressâ, scabratâ, latè umbilicatâ, cinereo-griseâ vel fuscescente, fasciis linearibus volventibus pallidè fuscis interdum subtus notatâ; spirâ anfractibus quinis convexiusculis; ultimo angulato, et propè aperturam deflexo; aperturâ circulari; labro simplici, continuo.

SYNONYMS AND REFERENCES.

Helix strigosa, GOULD, Proc. Bost. Soc. Nat. Hist. II. 166, Aug. 1846.

Expedition Shells, 18.

PFEIFFER, Monog. Helic. Viv. I. 121.

DESCRIPTION.

SHELL orbicular, slightly, and about equally, convex above and beneath, broadly umbilicated, surface irregular, and roughened above by indentations and coarse lines of growth, and by occasional fine revolving lines; smoother and shining beneath. Color ashy gray, somewhat mottled with dusky, or altogether rusty brown above, with, usually, a single, faint, revolving band on the middle of each whorl, and often with numerous bands, unequal in size and distance, beneath. Whorls five, moderately convex, the last one carinated at its commencement, and deflexed near the aperture, which is circular, with the lip simple, and nearly continuous; suture well impressed.

Greatest diameter nearly an inch; axis two-fifths of an inch.

GEOGRAPHICAL DISTRIBUTION. Brought by the U. S. Exploring Expedition from the interior of Oregon.

REMARKS. In form, it may be compared, among the shells of this continent, to *H. concava* and *H. alternata*; but, in its opaque and rugged aspect, and most of its characters, it nearly resembles *H. alpina* and its varieties, of Europe; but that species is more elevated, has a smaller umbilicus, the lip reflexed, and no revolving bands.—[G.]

52. **HELIX SPORTELLA, GOULD.**

PLATE XXII. *a.*

H. testâ planulatâ, fragili, nitidâ, luteo-corneâ, subtus concavâ, latè umbilicatâ, lineis incrementi conspicuis, et lineis volventibus subtilissimis confertis decussatâ; spirâ anfractibus quinis, ultimo magno; suturâ profundâ; aperturâ rotundatâ, infra subangulatâ; labro acuto, simplici.

SYNONYMS AND REFERENCES.

Helix sportella, GOULD, Proc. Bost. Soc. Nat. Hist. II. 167, Aug. 1846.

Expedition Shells, 18.

PFEIFFER, Monog. Helic. Viv. I. 111.

DESCRIPTION.

SHELL much depressed, convex above, concave beneath, sloping into a broad, tunnel-shaped umbilicus. Surface delicate and shining, of a pale, yellowish-green color, regularly sculptured with sharp, coarse lines of growth, which are crossed by fine, crowded, revolving lines, which cut merely the summits of the radiating ridges, so that, to the naked eye, the surface appears minutely granulated; but under a magnifier the raised

spaces are seen to be well defined squares. Whorls five, separated by a deep suture, the outer one proportionally large. Aperture nearly circular, a little angular at base, modified by the preceding whorl; lip acute, simple.

Diameter half an inch; axis a little over one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Brought by the U. S. Exploring Expedition from Puget Sound, Oregon.

REMARKS. Much like *H. concava*, Say, which, however, presents a very smooth surface, a smaller and less circular aperture, an umbilicus much broader, and the outer whorl increases less rapidly. I know of no American species which has the surface similarly decussated. *H. intertexta* is most like it in this respect. The specimens are immature, and probably the lip may be somewhat reflected in adults.—[G.]

53. *HELIX ALTERNATA*, SAY.

PLATE XXV.

H. testâ orbiculato-depressâ, latè et profundè umbilicatâ, striis elevatis, obliquis, crebris, scabrâ; albido et rufo alternè coloratâ; obscurè fasciatâ; aperturâ circulari; labro tenui, acuto.

SYNONYMS AND REFERENCES.

- Helix alternata*, SAY, Nich. Encyc. IV. pl. 1, f. 2; Journ. Acad. II. 161.
 KIRTLAND, Ohio Report, 172.
 SAGER, Michigan Catalogue, 14.
 BINNEY, Boston Journ. Nat. Hist. III. 428, pl. 35.
 GOULD, Invertebrata, 177, f. 114.

Helix alternata, ADAMS, Vermont Mollusca, 12, and figure.

FÉRUSSAC, Tab. Syst. 44 ; Hist. pl. 79, f. 8, 9, 10.

POTIEZ and MICH., Galerie, 104.

CHEMNITZ, 2 ed. tab. 24, f. 17, 18.

PFEIFFER, Monog. Helic. Viv. I. 102.

Helix scabra, LAMARCK, Anim. sans Vert. VI. 288.

DESHAYES, Encyc. Meth. II. 219 ; in Lamarck, VIII. 66.

DE KAY, New York Report, 31 ; Nat. Hist. pl. 2, f. 9.

Patula alternata, HELD, in Isis, 1837, p. 916.

Euryomphala alternata, BECK, Index Meth. 8.

DESCRIPTION.

ANIMAL. Head and tentaculæ light slate-color, back brown, remainder of upper surface brownish-orange, eyes black, base of foot grayish-white, collar saffron. Superior tentaculæ one-third of an inch long, blackish at the extremities. Foot not much exceeding in length the diameter of the shell, and terminating in a broad, obtuse, and flat extremity. A light marginal line runs along the edge of the foot from the head to the posterior part, those of the two sides meeting in an acute angle.

VARIETY. Head and neck blackish brown, tentacles blackish, foot brownish, base dirty white. In a single instance the whole animal was entirely black.

SHELL. Flattened-convex ; epidermis variegated with rufous bars and spots, arranged obliquely across the whorls ; whorls in full-grown individuals six, striated obliquely with raised, acute, equidistant, curved lines, which give a roughness to the surface ; aperture, viewed perpendicularly to its plane, nearly circular ; lip simple, thin, brittle, within shining, sometimes pearly ; umbilicus

large and deep, exhibiting all the volutions ; base paler than the upper surface, with a colored band more or less perfect, the colored bars, where they exist, narrow, and converging into the umbilicus.

Greatest transverse diameter about one inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northeastern and Middle States, and the Western States from the eastern end of Lake Superior to Arkansas. It will probably be found to exist in the whole territory of the United States.

REMARKS. In New England, this is perhaps the most common species of the genus. It abounds in the forests, and is not uncommon in the open country in moist situations, where it can find shelter under logs and stumps. It seems to be more gregarious than other species ; at any rate, numbers are more frequently found in the same retreat. It does not bear a change from a moist to a dry situation so well as many other species. In captivity it remains buried a great part of the time under the moist earth, with the body half protruded. If removed to the surface, it withdraws within the shell, protects its orifice by three or four coverings, and soon dies unless supplied with moisture.

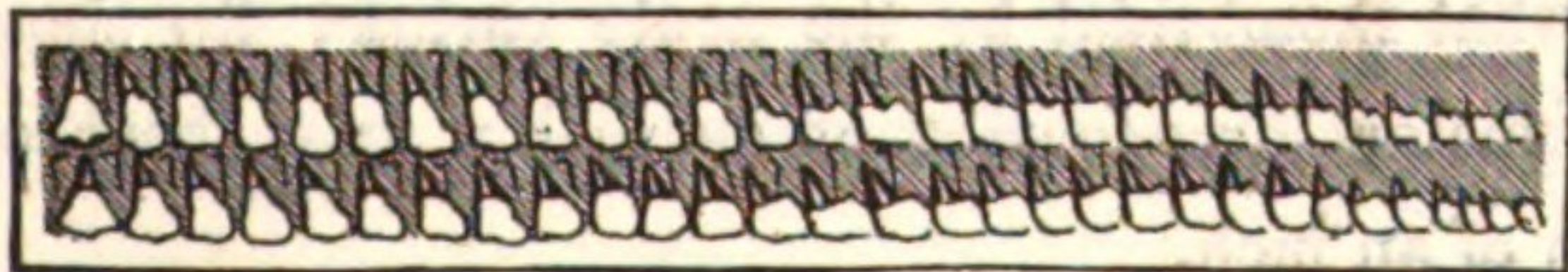
The foot of the animal is smaller, and the tentacles shorter, than in either of the other species possessing so large a shell ; it is also flatter and thinner. The collar is deeply tinged with the coloring matter which ornaments the shell, and which is sometimes secreted in such

profusion, as to give a saffron tinge to the trace which it leaves on objects over which it crawls. It is distributed over the animal, and arranged in minute points, which are most thickly clustered on the margin, and on the glandular tubercles of the surface.

The shell varies in being more or less depressed, and in having the striæ more or less rough. In the young shell the margin is carinated, especially at its junction with the second whorl. On many individuals there is a distinct, uncolored line on the centre of the outer whorl, dividing the rufous bands of the superior surface from those on the lower surface. There is a variety in which the shell is destitute of color; another in which the spire is sunk below the last whorl, leaving a projecting shoulder; a third which remains carinate when mature; and a fourth in which the striæ of increase are replaced by distinct, prominent, sharp ribs, placed rather widely apart.

This species was described and published by Mr. Say, in 1818, as *H. alternata*. In 1822, Lamarck gave it the specific name of *scabra*, a name pre-occupied by a species of Chemnitz. Say's name has the priority and is adopted in this country, as it should be elsewhere.

Lister's figure, Synops. t. 70, f. 69, represents this species. It is also noticed in the London Philos. Transactions, XX. (1698) No. 246, p. 395.



54. **HELIX CUMBERLANDIANA, LEA.**

PLATE XXVI.

H. testâ, latè umbilicatâ, lenticulari, acutè carinatâ, radiatim costato-striatâ, cinereâ vel flavidâ, fusco sub-tessellatâ ; spirâ depressâ, anfractibus quinis planulatis, marginatis ; aperturâ rhomboideo-circulari, labro acuto.

SYNONYMS AND REFERENCES.

Carocolla Cumberlandiana, LEA, Am. Phil. Trans. VIII. 229, pl. 6, f. 61.

DE KAY, New York Report, 47.

Helix Cumberlandiana, PFEIFFER, Monog. Helic. Viv. I. 125.

DESCRIPTION.

ANIMAL not known.

SHELL lenticular, acutely carinated, rather thin, sculptured with coarse, acute rib-striæ, of a pale yellowish, or sometimes ash color, irregularly checked with radiating, waved, brown blotches. Spire depressed, of about five whorls, very slightly convex, but excavated towards the margin, which is acute, and with a marginal, impressed line on both sides of the edge. Beneath, somewhat less convex, but the striæ less prominent, and its centre excavated by a deep, broad umbilicus, one-third the diameter of the base, and exhibiting all the whorls to the apex. Aperture rather wider than high, rendered somewhat rhomboidal by the acute carina ; lip simple.

Diameter three-fourths of an inch ; axis about one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. It has hitherto been noticed only in Western Tennessee.

REMARKS. The only species with which this can be compared is *H. alternata*, with which it nearly agrees in form, color, and sculpture. The carinated variety of the latter, especially, has a very close resemblance; and, although it has the marginal constriction under the carina, it does not appear above, as in *H. Cumberlandiana*. The shell before us is much more depressed, smoother beneath, much more broadly umbilicated, and, on account of the very decided peripheral carination, has a much more decidedly lozenge-shaped aperture.—[G.]

55. HELIX STRIATELLA, ANTHONY.

PLATE XXX. FIGURE 2.

H. testâ parvâ, orbiculato-depressâ, tenui, latè umbilicatâ, corneâ; anfractibus quatuor convexis, obliquè et minutè striatis; aperturâ transversâ, sub-rotundatâ; labro tenui, acuto.

SYNONYMS AND REFERENCES.

- Helix striatella*, ANTHONY, Boston Journ. Nat. Hist. III. 278, pl. 3, f. 2.
 BINNEY, Boston Journ. III. 432, pl. 21, f. 5.
 GOULD, Invertebrata, 178, f. 112.
 ADAMS, Vermont Mollusca, 12.
 DE KAY, New York Report, 43, pl. 3, f. 40.
 CHEMNITZ, 2d ed. tab. 85, fig. 36–38.
 PFEIFFER, Monog. Helic. Viv. I. 104.

DESCRIPTION.

ANIMAL. Head, neck, and tentacles, dusky; foot white.

SHELL depressed-convex, thin; epidermis light horn-color; whorls less than four, with numerous, delicate, oblique striæ; suture distinct, not much impressed; umbilicus large, showing all the volutions; aperture rounded, transverse; lip thin, acute.

Greatest transverse diameter less than one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States, is common in Ohio, and particularly abundant near Cincinnati, "in low bottom-lands, near the margins of running streams." It is also abundant in Massachusetts, near Boston, and in Vermont.

REMARKS. This species bears a very strong resemblance, in general aspect, to *H. perspectiva*, Say, with the immature shells of which it is very commonly confounded. It needs some attention to separate the two; but when the present species is once noticed, it cannot fail to be considered very distinct. Its discriminative characters, as compared with the former species, are as follows. The mature shell is smaller, and has generally rather less, and never more, than four whorls; and in shells of the same size the number of volutions is less. It is thinner and more delicate; its color is lighter; its striæ of increase are more numerous, more oblique, much finer, and less prominent; its suture is less deeply impressed; its spire is more convex, and its umbilicus less expanded. The character of the epidermis is the same in both. The lustre of the epidermis resembles that of satin.

This species closely resembles *H. ruderata*, Studer; and Prof. Adams declares that he cannot detect any difference in the two. I have found no difficulty in distinguishing them at first sight, but have not seen a sufficient number of specimens of the foreign species to enable me to speak confidently on the subject. It must, of course, be considered a doubtful species.

56. HELIX LIMATULA, BINNEY.

PLATE XXX. FIGURE 2.

H. testâ parvâ, orbiculato-depressâ, umbilicatâ, tenui, albidâ; anfractibus quatuor convexis, obliquè et minutissimè striatis; aperturâ sub-circulari, tenui, acuto.

SYNONYMS AND REFERENCES.

Helix limatula, WARD, MSS.

BINNEY, Boston Journ. Nat. Hist. III. 434, pl. 21, f. 2.

PFEIFFER, Monog. Helic. Viv. I. 113.

DESCRIPTION.

ANIMAL not observed.

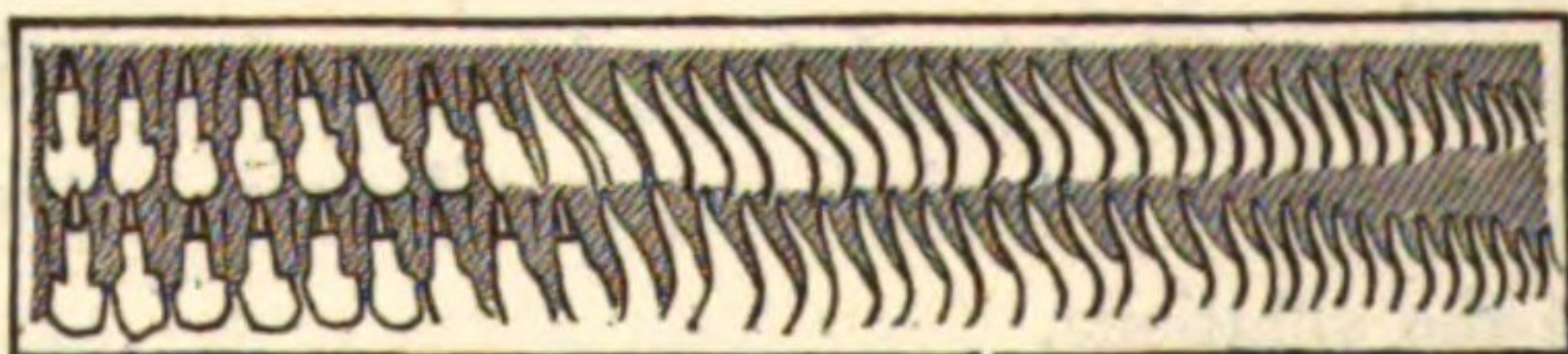
SHELL small, depressed; epidermis whitish, immaculate; suture distinctly impressed; whorls more than four, convex, with very fine, oblique, parallel striæ, which become obsolete on the base; aperture sub-circular, slightly modified by the penultimate whorl; lip thin, acute; umbilicus rounded, large and deep, not exhibiting all the volutions.

Greatest diameter about one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Has been found in many places in Ohio and in Indiana, also at Greenwich, N. Y. It probably inhabits all the low grounds bordering on the Ohio and its tributaries.

REMARKS. This shell resembles, in a considerable degree the preceding, particularly when the epidermis of that species has become bleached, but may be readily distinguished from it on comparison. Its epidermis is lighter, being nearly white; it is smaller, yet has nearly one more whorl; it is less convex, and the whorls are less prominent; the striæ of increase are finer and more delicate, and their direction is more nearly at right angles with the suture; the aperture is more nearly a direct section of the whorl; the body-whorl is more rounded on the base; the umbilicus is less spread or cup-shaped, and, though deep, does not exhibit all the volutions. The nucleus of the shell, or the original whorls, which exist when the animal leaves its egg, are much more minute and delicate.

For this species and the description of it, I was originally indebted to the late Dr. C. J. Ward of Roscoe, Ohio. I have since received the shell from several other sources.



57. **HELIX MINUSCULA, BINNEY.**PLATE XVII. *a.* FIGURE 2.

H. testâ minutâ, orbiculato-depressâ, umbilicatâ, albidâ ; anfractibus quatuor, convexis ; aperturâ circulari ; labro simplici, acuto.

SYNONYMS AND REFERENCES.

- Helix minuscula*, BINNEY, Boston Journ. Nat. Hist. III. 435, pl. 22. f. 4.
ADAMS, Vermont Mollusca, 11.
CHEMNITZ, 2d ed. tab. 85, f. 20-23.
PFEIFFER, Symbol. II. ; Monog. I. 114.
Helix minutissima, LEA, Proceed. Am. Phil. Soc. No. 19.

DESCRIPTION.

ANIMAL not observed.

SHELL. Minute, depressed-convex ; epidermis whitish ; whorls four, convex, not increasing rapidly in diameter ; suture very distinctly impressed ; aperture nearly circular ; lip thin, acute ; umbilicus large, not spread, deep, and exhibiting the volutions ; base rounded, columella with a thin callus.

Greatest transverse diameter less than one-eighth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Ohio, on the margins of streams, under chips or sticks in damp, shaded situations, or under the bark of decaying stumps near the surface of the waters, very common in the city of Cincinnati, among grass in gardens. It is also found rather abundantly in some parts of Vermont. Mr. Bartlett found it in Mississippi, Arkansas, and Florida.

REMARKS. This minute shell is but little larger than *H. pulchella*, which it resembles on its upper surface. It also bears some resemblance to small specimens of the preceding species. It has four full whorls, with deep sutures; is handsomely rounded; has a circular aperture, and a large umbilicus, which exhibits about two volutions. Its striæ of increase are too minute to be visible by the eye. It may be compared with *H. saxicola*, which is a larger and coarser shell, with the outer whorl somewhat carinate instead of cylindrical, the aperture more expanded, and the umbilicus less broad.

58. *HELIX FULIGINOSA*.

PLATE XXXI.

H. testâ orbiculato-depressâ, umbilicatâ, rufo-corneâ; anfractibus lævigatis, nitentibus; aperturâ expansâ, sub-orbiculari; umbilico profundo; labro simplici, tenui, acuto.

SYNONYMS AND REFERENCES.

Helix fuliginosa, GRIFFITH, MSS.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue.

BINNEY, Boston Journ. Nat. Hist. III. 417, pl. 24.

ADAMS, Vermont Mollusca, 11.

DE KAY, Nat. Hist. New York, 37, pl. 3, f. 22.

CHEMNITZ, 2d ed. tab. 84, f. 1-3.

PFEIFFER, Monog. Helic. Viv. I. 89.

Helix lævigata, FÉRUSAC, Tab. Syst. 45.

Helix capillacea, PFEIFFER, Symbolæ, II. 24.

DESCRIPTION.

ANIMAL nearly twice as long as the diameter of the

shell, blackish, or bluish black, darkest on the head, neck, and tentacles. Tentacles short in proportion to the length of the animal, and set widely apart. Respiratory foramen in the angle formed by the junction of the lip with the body-whorl. Base of foot whitish, the locomotive band defined by two very fine lines, or furrows. A double, marginal furrow runs along the sides of the foot, from the head nearly to the posterior extremity, where it passes upward, and joins that from the opposite side, leaving posteriorly a flattened, rounded extremity, somewhat prominent and glandular. Upon the centre of the extremity is a longitudinal fissure, or sinus, which is sometimes expanded, and at other times closed and invisible. Secretion of mucus from the extremity profuse.

SHELL thin, depressed on the upper surface; epidermis dark, approaching to chestnut-color, shining and smooth, wrinkled; whorls four and a half, with irregular, oblique wrinkles, the last whorl very voluminous, and expanding transversely towards the aperture; suture very little impressed; aperture ample, sub-circular, within pearly or iridescent; lip simple, thin, brittle, with a light, testaceous deposit within, the two terminations approaching each other very nearly; umbilicus deep, not much expanded.

Greatest transverse diameter more than an inch.

GEOGRAPHICAL DISTRIBUTION. Has been found in nearly all the Southern, Middle, Western, and Northern States.

REMARKS. The color of this shell varies from a light-greenish horn-color to a deep chestnut. The umbilicus varies considerably in size, but it is always distinct and profound. The surface, usually smooth and shining, is sometimes deeply and irregularly wrinkled. The interior of the aperture exhibits, in perfect specimens, a beautiful, pearly lustre. The epidermis is reflected over the edge of the lip into the aperture.

It has sometimes been confounded with *Helix inornata*; but it may always be distinguished from that, by attention to the following particulars. It is a much larger shell, yet the number of whorls is constantly one less; the umbilicus is larger and deeper, the aperture more circular, and the deposit of testaceous matter within is less. The color of the shell is usually much darker. It is, however, much more likely to be confounded with *Helix lucubrata*, Say, which it more nearly resembles. The difference between them will be pointed out in the remarks on that shell.

There is considerable confusion between this and the two most nearly allied species. It was indicated by Férussac, in 1822, by the name of *Helix lævigata* of Rafinesque, but without description or figure. That Férussac referred to this species, and not to the succeeding, is clear; because the word *lævigata* could only be applied to a smooth shell. At this time it had become known in cabinets of the United States by the specific name imposed by Dr. Griffith. In 1832 there appeared in Férussac's work a figure, pl. 82, f. 6, purporting to

represent this species, but in point of fact representing the striated shell herein described as *Helix lucubrata*. If, therefore, the two shells are specifically distinct, as I consider them, no description or figure has been given anterior to those published by me, and the name adopted by me from Dr. Griffith will have the prior right; but if, on the contrary, they are only varieties, both must merge under *Helix lucubrata*, Say, the first description having been published under that name in 1829.

59. HELIX LUCUBRATA, SAY.

PLATE XXXII.

H. testâ convexâ, perforatâ, viridi-corneâ; anfractibus quinque, regulariter striatis; aperturâ transversâ, expansâ; umbilico parvo; labro simplici, acuto.

SYNONYMS AND REFERENCES.

Helix lucubrata, SAY, Disseminator, &c. 1829.

Descriptions of New Terr. & Fluv. Shells, 13.

PFEIFFER, Monog. Helic. Viv. I. 98.

Helix lævigata, FERUSSAC, Hist. pl. 82, f. 6, 1832.

DESCRIPTION.

ANIMAL. Head and superior tentacles dark blue; body and foot pearly white; margin of foot furrowed, furrows meeting over posterior termination. Caudal extremity bluish above, with a gland.

SHELL somewhat convex; epidermis greenish horn-color, shining; whorls five, rapidly enlarging, with beau-

tiful and regular oblique striæ, the last whorl expanding towards the aperture; aperture transverse, ample, with a testaceous deposit within; lip thin, acute, not reflected, its lower extremity inserted into the centre of the base; umbilicus small.

Greatest diameter more than three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Ohio, Tennessee, Mississippi, Georgia, and South Carolina.

REMARKS. This shell has hitherto been known as a variety of *Helix fuliginosa*. It seems to me, however, that its characters are so constant that it deserves to be considered distinct from that species, at least provisionally, until the influences controlling the limits of species are better understood. It differs from the preceding in these particulars. The striæ of increase are beautifully regular and minute, though prominent, on the upper surface, but hardly noticeable on the lower; the epidermis is less shining and polished, the spire more prominent, the whorls more convex, and the apex more pointed. The umbilicus is small, and the lip, as it rises from it, a little reflected. The aperture is more transverse, and less circular. There are five full whorls, although it is a much smaller shell.

The first and only description of this shell, and the only figure hitherto published, are those referred to above. If this and the preceding species are only varieties of the same shell, they must both, by the laws of priority, be included under the name of *Helix lucubrata*.

60. **HELIX INORNATA**, SAY.

PLATE XXXIV.

H. testâ orbiculato-depressâ, perforatâ, luteo-corneâ, lævigatâ, nitente ; anfractibus quinque ; aperturâ transversâ, intus incrassatâ ; labro simplici, tenui, acuto ; basi impresso.

SYNONYMS AND REFERENCES.

- Helix inornata*, SAY, Journ. Acad. II. 371.
KIRTLAND, Ohio Report, 173.
SAGER, Mich. Catalogue, 14.
BINNEY, Bost. Journ. Nat. Hist. III. 419, pl. 21. f. 3.
DE KAY, Nat. Hist. New York, 39.
ADAMS, Vermont Mollusca, 11.
PFEIFFER, Monog. Helic. Viv. I. 84.

DESCRIPTION.

ANIMAL. Head, neck, and tentacles bluish black ; foot whitish. Superior tentacles long and slender. A marginal furrow extending along the edges of the foot, and uniting above and before its posterior termination. Behind the junction is a prominent, sub-conical, bluish-white gland, on the extremity of the foot.

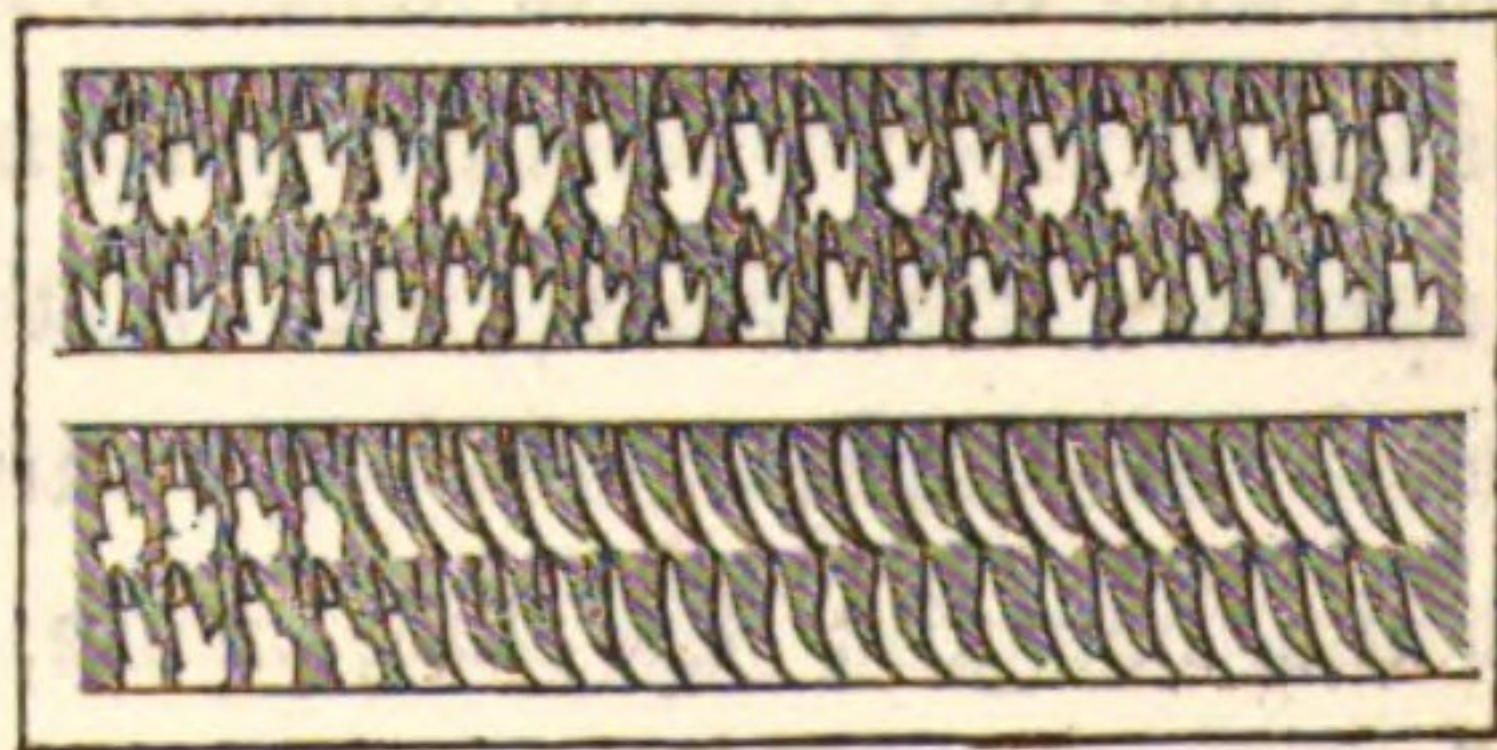
SHELL depressed ; epidermis yellowish horn-color, smooth, shining, with very minute lines not breaking the smoothness of the surface ; whorls five ; suture not much impressed ; aperture transverse, with a thick, white, testaceous deposit around its whole inner surface, a little distant from the margin ; lip thin, acute, fragile, its

lower part reaching to the centre of the base ; umbilicus small ; base rather flattened, indented in the centre.

Greatest diameter less than three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northern, North-eastern, and Western States, and is doubtless widely dispersed.

REMARKS. This shell bears some resemblance to the two preceding, with which it has been confounded ; it is, however, oftener taken to be *Helix glaphyra* of Say, by the naturalists of the West, where the latter, being an introduced species, common only near the sea-shore in cellars and gardens, is not found. Though resembling *Helix fuliginosa* in general appearance, it may be distinguished by the number of whorls, which are five, but which in that species, in specimens twice as large, but little exceed four. Its aperture is much less circular, the transverse diameter being considerably the greatest ; the umbilicus is smaller, being nearly closed, and more profound ; the volume of the last whorl is less, in proportion to the size of the shell ; the base is flatter, the color lighter, without the smoky tinge of the former species.



61. **HELIX SUB-PLANA, BINNEY.**

PLATE XXXIII.

H. testâ discoideâ, fuliginosâ, aut corneo-rufescente, nitente; spirâ depressâ; anfractibus quinque, vel sex; aperturâ semilunari, transversâ; labro simplici, acuto; basi plano; umbilico parvo.

SYNONYMS AND REFERENCES.

Helix sub-plana, BINNEY, Boston Journ. Nat. Hist. IV. 241.

PFEIFFER, Monog. Helic. Viv. 112.

DESCRIPTION.

SHELL flattened, planulate above and beneath; epidermis brownish or smoky horn-color, shining; whorls five and a half, those nearest the apex striated transversely with very minute and delicate wrinkles; suture distinct, not much impressed; aperture transverse, not expanded, the plane of the aperture making nearly a right angle with the plane of the base of the shell; lip simple, thin, acute; base flattened, umbilical region a little impressed; umbilicus small, round, and deep, not exhibiting the volutions.

Greatest diameter less than three-fourths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found hitherto only in the mountainous region of Eastern Tennessee.

REMARKS. The only American species which this shell can be said to resemble is *Helix inornata*, which in size and color is quite like it, and at first sight may be taken for it. It differs from it in the following parti-

culars. The upper and lower surface are both more flattened, and the outline is a more perfect circle. The number of whorls, in specimens of the same size, is greater by nearly one volution. The surface of the whorls is less rounded; the last whorl expands but very little towards the aperture; the base is broader, less indented, and very flat; the umbilicus is rounder, and better defined; and the aperture is not thickened within, by a white, testaceous deposit.

I have seen but two specimens, which were brought from Tennessee by Mr. S. S. Haldeman.

62. *HELIX CELLARIA*, MÜLLER.

PLATE XXIX. FIGURE 4.

H. testâ orbiculato-depressâ, umbilicatâ, tenui, pellucidâ, nitidâ, supra pallidè corneâ, subtus lacteâ; anfractibus quinque; labro simplici, acuto; basi intus incrassato.

SYNONYMS AND REFERENCES.

- Helix cellaria*, MÜLLER, Verm. No. 230.
BINNEY, Boston Journ. Nat. Hist. III. 421.
GOULD, Invertebrata, 180, f. 104.
PFEIFFER, Monog. Helic. Viv. I. 111.
Helix glaphyra, SAY, Nich. Encyc. IV. pl. 1, f. 3.
DE KAY, Nat. Hist. New York, 37, pl. 3, f. 25.
Helix nitida, DRAPARNAUD, 117, pl. 8, f. 23 to 25.

DESCRIPTION.

ANIMAL. Upper surface light indigo blue, darkest on the head, neck, and tentaculæ, collar greenish, eyes black. Foot narrow and slender, not much exceeding in length the diameter of the shell, terminating acutely.

SHELL very much depressed, thin, fragile, pellucid; epidermis light greenish horn-color, smooth, highly polished; whorls five, slightly rounded, with minute and almost imperceptible, oblique striæ; aperture not dilated, its transverse diameter the greatest; umbilicus moderate, regularly rounded, deep; base rounded, thickened within by a testaceous deposit, bluish-white; lip simple, acute.

Greatest transverse diameter less than half an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northeastern and Middle States, in gardens; is common in the city of Boston, in damp cellars.

REMARKS. This is the shell which was found by Mr. Say, in gardens in the city of Philadelphia, and by him described as *Helix glaphyra*. Its restricted habitat in cellars and gardens in the immediate vicinity of maritime cities, long since induced me to suppose it might be an imported species; and an opportunity of examining a considerable number of specimens of *Helix cellaria*, Müller, brought from England, enables me to say, that it is absolutely identical with that species. Shells of the same size and growth from the European and American localities cannot be distinguished from each other. Its introduction is easily accounted for, when we consider its habits. It has been found also in New Holland, and many parts of the world remote from each other, where it was doubtless conveyed on water casks, and packages usually stored in cellars.

63. *HELIX DEMISSA*, BINNEY.

PLATE XLII. FIGURE 1.

H. testâ depresso-concavâ, perforatâ, luteo-corneâ, nitente; anfractibus sex, minutè striatis; aperturâ transversâ; labro simplici, acuto; basi glabrâ; umbilico parvo.

SYNONYMS AND REFERENCES.

Helix demissa, BINNEY, Boston Journ. Nat. Hist. IV. 361, pl. 16, f. 1.
PFEIFFER, Monog. Helic. Viv. I. 58.

DESCRIPTION.

SHELL depressed-convex; epidermis yellowish horn-color, shining; whorls six, with minute lines of growth; spire obtuse; suture impressed; body-whorl expanding very little towards the aperture; aperture transverse, not large, a white, testaceous deposit within; lip thin, acute; base rather flat, smooth; umbilicus very small; umbilical region a little impressed.

Greatest transverse diameter rather more than three-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. The only specimens which I have yet seen were procured in the Western part of Pennsylvania.

REMARKS. This is a delicate and very pretty species, and is distinct from every thing, unless it be *Helix ligera*. The character of the surface and striæ is the same in both; and the base is nearly the same. I have seen

very depressed specimens of *Helix ligera*, but none approaching this. It may, however, be subject to still further reductions in the height of the spire, until it reaches the depression of the present shell. If it should be the same, it will exhibit very extraordinary variations in this respect, from a high conical to a planulate form. It resembles *Helix suppressa* externally, in every thing except in size and in being less coarsely striate.

64. HELIX LUCIDA.

PLATE XXII. a. FIGURE 2.

H. testâ orbiculato-depressâ, latè umbilicatâ, nitidâ, pel-lucidâ, fulvo-fuscâ; anfractibus quinque convexiusculis, ultimo tereti, circa umbilicum excavato; aperturâ lunato-circulari, labro acuto, simplici, margine basali arcuato.

SYNONYMS AND REFERENCES.

Helix nitida, MÜLLER, Verm. II. 32, No. 234.

also of Lamarck, Beck, Pfeiffer, &c.

Helix lucida, DRAP. 103, pl. 8, f. 11, 12.

also of Rossmassler, J. E. Gray, &c.

DESCRIPTION.

ANIMAL not described.

SHELL orbicular, depressed, moderately convex above and concave below, thin, shining, brownish horn-color, with delicate striæ of growth. Whorls five or more, convex, separated by a deeply impressed suture, the outer one disproportionately large, somewhat declining as it

approaches the aperture, and obtusely angular at the periphery. Beneath forming a broad, crateriform umbilicus, in which the whorls are displayed to the apex. Aperture oblique, lunate, the lip simple.

Diameter one-fourth of an inch; axis one-eighth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found at Greenwich, N. Y. by Dr. Ingalls, on sticks, leaves, &c. on the very edge of a pond, and in such numbers that he had seen "a thousand under a single plank six feet long."

REMARKS. It may well be doubted whether this is the *H. lucida* of Europe or not. In the first place, it is difficult to know what shell is meant in the European books, when *H. lucida* is spoken of. Then, it appears to be larger than the specimens I have seen under that name. Still, small specimens accord so well with European examples, that it has been thought best for the present to regard it as that species. The fact that it has, as yet, been found at only a single locality, is another reason for supposing it to be an introduced species. It is a third larger, and has a broader and more open umbilicus, than *H. arborea*. It is of the size of *H. nitidula*; but is a less solid shell, and less depressed. In some specimens there are opaque patches on the base, caused by a deposition of callus. Dr. Ingalls has distributed it under the name of *H. hydrophila*, which name should be adopted, should further observations show it to be a new species.

65. **HELIX ARBOREA, SAY.**

PLATE XXIX. FIGURE 3.

H. testâ parvâ, orbiculato-depressâ, tenui, pellucidâ, nitidâ, umbilicatâ; aperturâ sub-rotundatâ; labro simplici, acuto.

SYNONYMS AND REFERENCES.

- Helix arborea*, SAY, Nich. Encyc. IV. pl. 4, f. 4.
KIRTLAND, Ohio Report, 172.
SAGER, Michigan Catalogue, 14.
BINNEY, Boston Journ. Nat. Hist. III. 422, pl. 22, f. 1.
DE KAY, Nat. Hist. New York, 30, pl. 2, f. 19.
GOULD, Invertebrata, 182, f. 110.
ADAMS, Vermont Mollusca, 10; Sillim. Journ. XL. 273.
WHEATLEY, Catal. of Shells, p. 19.
PFEIFFER, Monog. Helic. Viv. I. 95.
CHEMNITZ, 2d ed. tab. 85, f. 33-35.

DESCRIPTION.

ANIMAL. Head, neck, and tentaculæ blackish, or indigo blue, upper parts bluish, posterior parts whitish, transparent, sometimes wholly white. Foot thin and narrow.

SHELL depressed, very slightly convex, thin, pellucid; epidermis amber-colored, smooth, shining; whorls four to five, with very minute, oblique striæ, apparent when viewed with a microscope; aperture somewhat rounded; lip thin, acute; umbilical region indented; umbilicus moderate, well developed, round, and deep.

Transverse diameter commonly about one-sixth of an inch, sometimes attains one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Has been noticed in nearly every part of the United States, and in Canada.

REMARKS. This a very common species, inhabiting forests, cultivated fields, and gardens. A situation of which it seems very fond is in the crevices of wet, decaying wood. It resembles the preceding species; and Férussac considered it to be only a variety of that species. A comparison of the two shows distinctions which must, I think, prevent their being considered identical. It is smaller, and has its umbilicus less developed in proportion to its size. In their general aspect the two are quite unlike; but it is easier to distinguish them by the eye than to describe differences where there are no peculiarities of sculpture or coloring. The animal may present further distinctive marks.

66. HELIX ELECTRINA, GOULD.

PLATE XXIX. FIGURE 1.

H. testâ parvâ, depressâ, umbilicatâ, tenui, pellucidâ; anfractibus quatuor, striatis; aperturâ rotundatâ; labro simplici.

SYNONYMS AND REFERENCES.

Helix electrina, GOULD, Invertebrata, 183. f. 111.

BINNEY, Boston Journ. Nat. Hist. III. 423, pl. 22, f. 2.

DE KAY, Nat. Hist. New York, 30.

ADAMS, Vermont Mollusca, 11.

DESCRIPTION.

ANIMAL bluish black.

SHELL small, depressed, thin, fragile ; epidermis pale, or brownish horn-color, wrinkled, shining ; whorls four, the last rapidly enlarging towards the mouth ; aperture rounded ; lip simple, its edge rather thickened, not acute ; umbilicus small, but well marked and constant.

Greatest transverse diameter more than one-eighth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Vermont, Ohio, Missouri, and Massachusetts, and is a widely spread species. Found on the shores of Fresh Pond, near Boston.

REMARKS. For the following remarks I am indebted to Dr. Gould. "In size, the depressed-conical shape of the upper surface, the number of whorls, and the rapid enlargement of the largest whorl, this shell corresponds with *Helix indentata*. It differs in its darker, smoky horn-color, its constant umbilicus, its rather thick and shining lip, and in its whitish wrinkles, which, instead of being remote, are crowded. From *Helix arborea* it differs in having one whorl less, the last one rapidly dilating, its apex not being depressed, its thinner structure and more glossy surface, and in its somewhat smaller umbilicus. In *Helix arborea* the lip has a flexuous curve, but is nearly a direct section of the whorl in this. Though all of the same size and general appearance, the three may be readily separated when mingled. Indeed, its claims as a distinct species are not very obvious without viewing the three together. It is found

abundantly under fragments of wood, in damp places near the water's edge, in company with *Helix chersina* and *Pupa modesta*."

On its upper surface, it appears to be identical with *Helix indentata*; while on the base, its resemblance to *Helix arborea* is striking. It appears to be a widely diffused, and very common species. It is often found in company with *H. arborea*.

67. *HELIX OTTONIS*, PFEIFFER.

PLATE XXIX. *a*. FIGURE 3.

H. testâ depressâ, pallidè corneâ, pellucidâ, umbilicatâ, basi sub-planâ; anfractibus quatuor convexiusculis, striatis; labro tenui, acuto; aperturâ sublunari.

SYNONYMS AND REFERENCES.

Helix Ottonis, PFEIFFER, Wiegmann's Archiv. 1840, I. 251.

Helix arborea, (variety) PFEIFFER, Monog. Helic. Viv. II. 95.

DESCRIPTION.

SHELL small, depressed, orbicular, but not remarkably transparent, of a watery horn-color, becoming opaque when dead, very faintly marked by the lines of growth. Spire of about four slightly convex whorls, the outer one obscurely angular at periphery; suture very delicate; beneath convex, with a small, well defined umbilicus. Aperture crescentic, lip simple.

Diameter one-fifth of an inch; axis one-tenth of an inch,

GEOGRAPHICAL DISTRIBUTION. It seems to be quite abundant in Florida, and is also common in Cuba.

REMARKS. It would seem that Dr. Pfeiffer, who established this species, afterwards concluded that it was identical with *H. arborea*. A comparison of numerous specimens has led us to the contrary conclusion. The shell is smaller, smoother, less delicate; the whorls are less rounded, less distinctly separated by the suture; and the periphery is decidedly angular; the upper surface is declivous, rather than discoidal; and the base is less openly umbilicated. In size it is more nearly like *H. electrina*; but it differs as above in all other respects.—[G.]

68. HELIX CAPSELLA, GOULD.

PLATE XXIX. *a*. FIGURE 1.

H. testâ parvâ, discoideâ, pellucidâ, nitidâ, electrinâ, umbilico infundibuliformi profundo perforatâ; spirâ anfractibus sex, minimè convexis, striis remotis supernè impressis; suturâ marginatâ; aperturâ semilunari; labro simplici, haud incrassato.

SYNONYMS AND REFERENCES.

Helix rotula, GOULD, Proc. Bost. Soc. Nat. Hist. III. 38, June, 1848.

DESCRIPTION.

SHELL quite small, planorboid, pellucid, glistening, amber-colored. Spire nearly plane, composed of about six and a half, closely revolving, flattened whorls. Surface with distant, impressed, radiating striæ. Suture

margined. Aperture narrow, semilunar; lip simple, not thickened by callus within. Base perforated by a deep, rather small, funnel-shaped umbilicus.

Diameter one-fifth of an inch; axis one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found by Mr. Bartlett, in Tennessee.

REMARKS. This delicate species has the size and color of *H. indentata*, and is similarly striated above. The whorls are numerous and closely convoluted, as in *H. suppressa*, which it most nearly resembles; but it has a larger umbilicus, like *H. lasmodon*, and has no thickening, or plate, within the aperture. The name first applied to this species being preoccupied, another has been substituted.—[G.]

69. *HELIX SELENINA*, GOULD.

PLATE XXIX. *a.* FIGURE 2.

H. testâ parvâ, depressâ, albidâ, tenuissimâ, minutissimè striatâ, diaphanâ; anfractibus quinque, convexis, ultimo sub-angulato; suturis impressis; basi convexo; axi aperto, umbilico infundibuliformi; aperturâ depresso-transversâ; labro simplici, acuto.

SYNONYMS AND REFERENCES.

Helix ——— BINNEY, Proc. Bost. Soc. Nat. Hist. II. 25.

Helix selenina, GOULD, Proc. Bost. Soc. Nat. Hist. III. 38, June, 1848.

DESCRIPTION.

SHELL small, depressed, pale bluish-white, pearly,

very thin, transparent; whorls five, prominent, with exceedingly minute, oblique striæ of increase; suture deeply impressed; base somewhat convex; axis open, umbilicus infundibuliform; aperture flattened-transverse; lip thin, acute, not reflected.

Greatest diameter one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the southern parts of Florida, and the islands adjacent; also the island of St. Croix.

REMARKS. This small species does not exceed *Helix arborea* in size. Its transparency is greater than that of any other of our species. The general character of its upper surface is that of depression; but though the whorls revolve in nearly the same plane, the suture is so deeply impressed that each whorl is rendered convex, or tumid. The umbilicus is of small diameter, but well defined and deep. The aperture is transverse, and flattened in its vertical diameter; the lip is thin, sharp, and not turned outwards. The convexity of the base being greater than that of the upper surface, an obtuse angle is sometimes produced on the periphery of the shell at the line of their junction, which is more or less prominent in different specimens.

This shell is obviously identical with a *Helix* brought from the island of St. Croix by Dr. R. E. Griffith, and distributed by him to several cabinets in the United States. There can hardly be a doubt that it exists in some of the other West Indian Islands. Specimens have

been sent to us, also, which were *said* to have been procured in Georgia.

70. HELIX INDENTATA, SAY.

PLATE XXIX. FIGURE 2.

H. testâ minimâ, depressâ; convexiusculâ, imperforatâ, tenuissimâ, diaphanâ, nitidâ; ultimo anfractu lineis impressis, distantibus, radiatis ornato; aperturâ transversâ; labro simplici, acuto; basi indentato.

SYNONYMS AND REFERENCES.

- Helix indentata*, SAY, Journ. Acad. II. 372.
KIRTLAND, Ohio Report, 173.
BINNEY, Boston Journ. Nat. Hist. III. 415, pl. 22, f. 3.
DE KAY, Nat. Hist. New York, 31, pl. 3, f. 26.
GOULD, Invertebrata, 181, f. 109.
ADAMS, Vermont Mollusca, 10.
CHEMNITZ, 2d. ed. t. 34, f. 12-15.
PFEIFFER, Monog. Helic. Viv. I. 59.

DESCRIPTION.

ANIMAL bluish-black upon the upper parts; margin and posterior extremity lighter.

SHELL flattened, thin, pellucid; epidermis highly polished, corneous, whorls rather more than four, rapidly enlarging, with regular, sub-equidistant, radiating, impressed lines, which on the body-whorl extend to the centre of the base, outer whorl expanding towards the aperture; suture well impressed; aperture rather large, transverse; lip simple, very thin, at its inferior extremity terminating at the centre of the base of the shell; umbilicus none, but the umbilical region is indented.

Greatest transverse diameter more than one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northern, North-eastern, Middle, and Western States, and is probably a wide-spread species.

REMARKS. This shell is found in the same situations as *Helix arborea*, Say, and resembles it very much, particularly on its upper surface. It may be distinguished from it by the outer whorl, which is more spread towards the aperture; by the impressed, radiating lines, and by the want of an open umbilicus. The whorls, in this species, usually revolve in such a manner as to leave no opening between them; but there is an occasional specimen with a well-formed umbilicus.

71. HELIX CHERSINA.

PLATE XVII. FIGURE 4.

H. testâ minimâ, conoideâ, nitidâ, tenuissimâ, pellucidâ, imperforatâ; aperturâ transversâ; labro simplici, acuto; basi convexo.

SYNONYMS AND REFERENCES.

Helix chersina, SAY, Journ. Acad. II. 156.

Exped. St. Peters, II. 258.

BINNEY, Boston Journ. Nat. Hist. III. 416, pl. 26. f. 2.

GOULD, Invertebrata, 185, f. 105.

ADAMS, Vermont Mollusca, 12; Sillim. Journ. XL. 273.

DE KAY, Nat. Hist. New York, 44, pl. 35, f. 338.

DESCRIPTION.

ANIMAL bluish-black upon the head, neck, and tenta-

cles, lighter on the sides and base; foot very narrow, threadlike.

SHELL minute, sub-conical, thin, pellucid; epidermis smooth, shining, amber-colored; whorls five or six, rounded; suture distinct and deep; aperture transverse, narrow; lip simple, acute; base convex; umbilical region indented, umbilicus closed.

Transverse diameter one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the sea-islands of Georgia, the hill-sides of Vermont, the North-western Territory, and the shores of Fresh Pond, near Boston. It is also met with from Ohio to Texas.

REMARKS. The above-named localities prove this to be a widely-spread species. Its diminutive size has probably prevented its being observed in other places. It offers but few varieties, and is easily distinguished by its conical form, and thin, amber-colored, transparent shell. It is a very beautiful and delicate little species. The spire is elevated, turreted, attaining even seven full volutions, with an obtuse apex; at other times it is much lower, with a somewhat pointed apex, and not exceeding five volutions. In the latter case, the base is of course much broader in proportion to the height, and the outer whorl is obtusely carinated. The plane of the base is so nearly horizontal, that the shell, when set upon its base, is upright. It is so transparent, that a portion of the sutures of the spire are visible through the substance of the shell, when viewed on the base.

It is found under, and in the interstices of wet, decaying wood, under layers of damp leaves in forests, and under fragments of wood on the borders of ponds.

I have recently examined the original specimen of the shell described by Mr. Say as *Helix egena*, and by him deposited in the collection of the Academy of Natural Sciences, in Philadelphia. I could not, on careful comparison, detect any difference between it and the depressed variety of *H. chersina*. Mr. J. S. Phillips, the obliging curator of the department of conchology in that institution, joined me in the opinion that the two are clearly identical. The European analogue of this species is *H. fulva*; and the resemblance to each other is very close, so much so that some have considered them as identical.

72. HELIX EGENA, SAY.

PLATE XXII. *a.* FIGURE 3.

T. minutâ, sub-globosâ, dilutè rufâ, arctè perforatâ, striatâ; anfractibus ad quinque rotundatis; suturâ profundâ; aperturâ circulari; labro simplici, sub-dilatato, ad umbilicum reflexo.

DESCRIPTION.

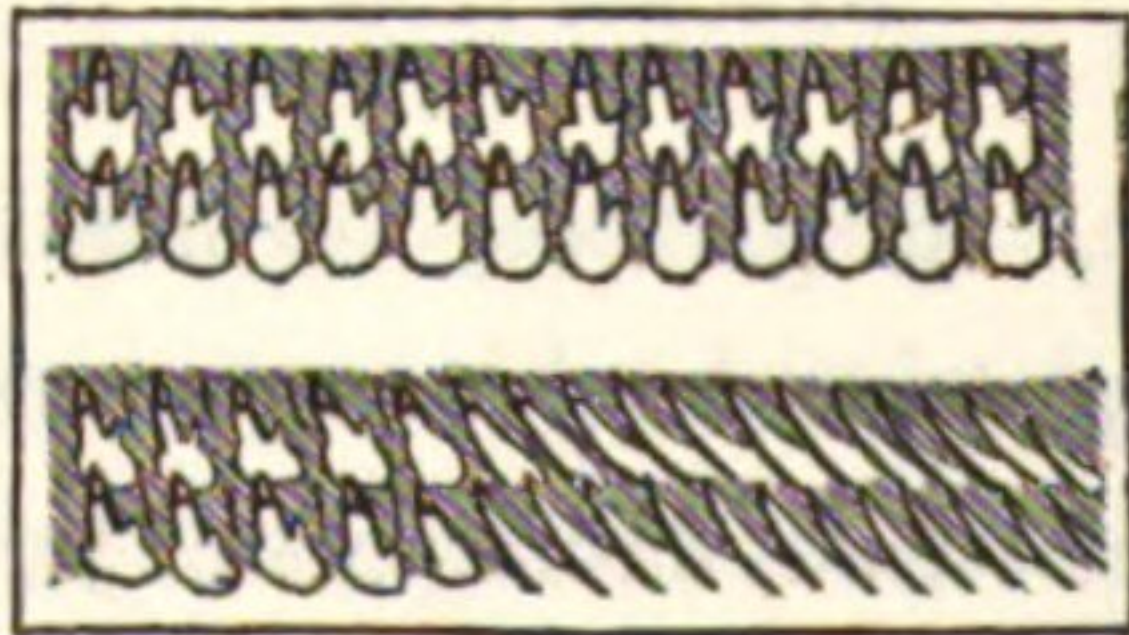
SHELL minute, sub-globose, turbinate, rather solid, pale rusty-brown, striated with numerous, faint lines of growth. Spire elevated, having about five closely revolving, well rounded whorls, separated by a very deep suture; periphery rounded; base convexly rounded, and

perforated by a small, deep umbilicus. Aperture nearly circular, interrupted for a short space by the penultimate whorl; lip simple, slightly expanded, and at the columellar region decidedly reflexed.

Diameter one-eighth, axis one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Florida, and is also common in the neighboring part of Cuba.

REMARKS. There are grounds for the belief that the original *H. egena* of Say was the depressed form of what is now regarded as *H. chersina*, while the latter name was applied by him to the elevated variety. As we regard both forms as varieties of the same species, and as the name *chersina* universally obtains for it, we have concluded to adopt it, and to attach the other name to this very nearly allied Florida species. It is a coarser and more solid shell, with a more depressed form, fewer whorls, and a decided umbilical perforation. It is rather opaque, and has a pale brown color, instead of being delicate and horn-colored. It must be very similar to *H. Boothiana*, Pfeiffer, from Cuba.—[G.]



f. Aperture having one or more teeth or folds.

73. HELIX INTERNA, SAY.

PLATE XXX. FIGURE 4.

H. testâ convexo-depressâ, imperforatâ, rufâ ; anfractibus octo, valde striatis, striis eminentibus, crebris, obliquis ; aperturâ transversali, angustâ ; labro simplici, acuto, intus incrassato et bidentato ; dentibus albis, laminatis ; basi lævigato ; regione umbilicali impressâ.

SYNONYMS AND REFERENCES.

Helix interna, SAY, Journ. Acad. II. 155.

KIRTLAND, Ohio Report, 173.

BINNEY, Boston Journ. Nat. Hist. III. 405, pl. 21, f. 1.

DE KAY, Nat. Hist. New York, 46.

CHEMNITZ, 2d ed. tab. 101, f. 1-4.

PFEIFFER, Monog. Helic. Viv. I. 183.

Helix pomum Adami, DOUGHTY's Cab. III. 35.

DESCRIPTION.

ANIMAL. Head, neck, and tentacles bluish-black, or slate-color, margin and posterior part of foot white. Superior tentacles very long, inferior very short ; body narrow and delicate, in length not much exceeding the diameter of the shell.

SHELL depressed, slightly convex ; epidermis reddish-brown, shining ; whorls eight, with regular, equidistant, elevated, oblique, rounded ribs, separated by distinct grooves ; suture deeply impressed ; aperture flattened, transverse, narrow ; lip thin, acute, thickened internally ; within the aperture, on the outer lip, somewhat distant from the margin, are two prominent, sub-lamelliform,

white teeth; base smooth, polished, umbilical region indented.

Greatest transverse diameter one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Ohio, Missouri, and the western parts of Pennsylvania and Virginia. It will probably be found in all the Western States.

REMARKS. This is a beautiful, as well as a very distinct species. Its uniform, shining, reddish-brown color is peculiar to it. Its numerous, narrow whorls, increasing almost imperceptibly in width from the apex outward, with their very prominent, elevated striæ of increase, give it a considerable resemblance on the upper surface to the *Polygyræ* of Say; but on the base the similarity ceases. The aperture, including the teeth, is very much like that of *Helix gularis*, Say, but is smaller in proportion to the size of the shell; and the teeth are shorter and less lamellar, while they are equally prominent. The oblique striæ, so distinct on the upper surface, cease entirely at an obtuse carina on the upper part of the outer whorl, leaving the base smooth. The base is lighter in color than the upper surface, and is indented at the centre. The umbilicus is nearly, or quite obsolete. The edge of the lip is brown. The whole surface sometimes, and the base often, reflects a metallic lustre.

The teeth within the aperture are in general formed of a single prominent lamina, or tooth-like fold; but sometimes one, or both of them, are bifid, or even trifid. A

second set often, and sometimes a third set of teeth are seen through the transparent base of the shell, irregularly striated, but generally having equal spaces between each two sets. They are apparent in the youngest as well as in the oldest specimens, and continue to be formed from time to time, so long as the shell increases in size. They probably mark regular periods of growth; and it may be that these are annual. The growth seems to go on actively for a time, by the addition of new testaceous matter, indicated by the oblique striæ, and then alternates with a season of repose, when the teeth and aperture are formed.

The teeth appear never to be entirely absorbed and removed, although the aperture, near which they were originally placed, is often advanced very far beyond them. When in motion, the shell lies horizontally on the animal's back.

A curious subject of investigation is the albinism, or entire absence of coloring matter, in the shells of certain individuals of this and other species. The albinos of this species are of a pure, lively white, while the contained animal is highly colored. Mr. Anthony remarks that about one-seventh of all the specimens collected by him, in the neighborhood of Cincinnati, are colorless. As they are apparently operated upon by the same physical agents which influence the others, it is not easy to conjecture how this singular effect is produced. The animal is sometimes cream-colored throughout; but in such instances the shell is usually colored.

74. **HELIX GULARIS, SAY.**

PLATE XXXVII. FIGURES 3, 4.

H. testâ elevato-convexâ, nitidâ, imperforatâ, luteo-corneâ ; anfractibus septem, striatis ; labro simplici, acuto, intus incrassato ; aperturâ transversali, dentibus duobus lamellatis internè armatâ ; basi plano.

SYNONYMS AND REFERENCES.

Helix gularis, SAY, Journ. Acad. II. 156.

KIRTLAND, Ohio Report, 173.

BINNEY, Boston Journ. Nat. Hist. III. 408, pl. 11, f. 1.

DE KAY, Nat. Hist. New York, 46.

FÉRUSAC, Hist. pl. 51, a. f. 4. (?)

CHEMNITZ, 2d ed. tab. 101, f. 5-8.

PFEIFFER, Monog. Helic. Viv. I. 183.

DESCRIPTION.

ANIMAL bluish-black on the head and back, the other parts dingy white ; tentacles long, slender, enlarged, but not much bulbous at tip ; foot above, dirty greenish.

SHELL sub-conical ; epidermis shining, pale yellowish horn-color ; spire sometimes tending to a point, at other times obtuse ; whorls seven or eight, very minute at the apex, increasing in diameter regularly and gradually, until they reach the aperture, with strongly marked, curved striæ ; suture impressed and distinct ; aperture transverse, not much expanded ; lip simple, thin at its edge, within thickened with a white, testaceous deposit ; base flat, indented in the centre, near the aperture yellowish-white and opaque ; umbilicus small and rounded in young

shells, obsolete or diminished to a mere point in older ones ; within the aperture on the outer lip, are one or two lamelliform, elongated, nearly parallel teeth, one near the base, the other more central.

Greatest transverse diameter nearly three-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. The only localities I am acquainted with which furnish this species, are East Tennessee and North Alabama. Mr. Say records it as found in Ohio and Pennsylvania, and it is placed upon the catalogues of Dr. Kirtland and Dr. De Kay. I am induced to suppose that they have, by error, taken *Helix suppressa*, Say, to be the present species.

REMARKS. The identification of this species and of *H. suppressa*, Say, has long been a desideratum. Specimens of a small shell, with a small and rounded, but profound umbilicus, and with two internal teeth, exist in almost every cabinet. In some particulars each resemble *Helix gularis*, Say, in others, *Helix suppressa*, Say ; and as the resemblance preponderates in favor of one or the other, they are known by one or the other name. They do not, however, agree entirely with Mr. Say's description of either ; and hence some conchologists have supposed that he described from varieties only ; but I have recently received specimens, collected by Mr. Haldeman in East Tennessee, which, as well as others in the cabinets of Mr. Lea and Dr. Jay, correspond perfectly with *H. gularis*. They are larger than the common speci-

mens, being one-fourth of an inch in diameter, and differ from them in having the umbilicus entirely closed. They have seven full whorls, which are beautifully fine and distinct to the very nucleus, which is uncommonly small. I consider the umbilicated shells to be immature, or not fully developed; though an examination of a larger number may show that the full-grown shell is also umbilicated.

The present species resembles some varieties of *Helix ligera*, Say, in form and general appearance, although its size is much less. This remark, which was made by Say, in his original description, is entirely inapplicable to the specimens which are usually known as *Helix gularis*. It also resembles *Helix suppressa*, Say, the next described species, with which it has long been confounded. But it has at least one more whorl; the spire is much higher; the nucleus of the shell is smaller, so that the first two whorls are finer and more delicate; and the base is not so convex. The base of the shell is exceedingly like that of *Helix interna*.

It is the totality of the characters which makes up the species; for individuals differ considerably in the height of the spire, the size of the umbilicus, and in the degree of prominence of the teeth. One tooth is often wanting.

The deposition of testaceous matter, thickening the shell at its aperture, occupies about one-fourth of the base, through which it is seen. The character of the lamellar folds, within the aperture, resembles those of *Helix epistylium*, Müller, in which species they are large and prominent, although usually overlooked in the descriptions.

75. **HELIX SUPPRESSA, SAY.**

PLATE XXXVII. FIGURE 1.

H. testâ convexo-depressâ, minutè perforatâ, nitidâ, luteo-corneâ; anfractibus sex, crebrè et minutè striatis; labro simplici, acuto, intus incrassato; aperturâ transversali, dente unico lamelliformi armatâ.

SYNONYMS AND REFERENCES.

Helix suppressa, SAY, Disseminator, &c.

Desc. of New Terr. and Fluv. Shells, 14.

BINNEY, Boston Journ. Nat. Hist. III. 410, pl. 11, f. 3.

DESCRIPTION.

ANIMAL bluish-black, darker on the head, tentacles, and neck; superior tentacles long and filiform, lower short. Length twice the diameter of the shell. On the upper surface of the extremity of the foot is a longitudinal fissure or furrow, from which mucus exudes in great quantities, and which the animal shuts and closes at will.

SHELL convex-depressed, thin, pellucid; epidermis polished, yellowish horn-color; spire flat; whorls six, with crowded, minute, oblique striæ; suture impressed, distinct; aperture transverse, not expanded; lip simple, thin at its edge, thickened within; base rather convex, near the aperture opaque, yellowish white; umbilicus small, but rounded and distinct, in young shells, obsolete or hardly apparent in older ones; within the aperture on the outer lip, are one or two lamelliform, elongated, oblique teeth.

Greatest transverse diameter one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Middle States and Ohio, and without doubt may be found in other States.

REMARKS. This shell does not correspond exactly with Say's description; but I think it is the same that he described under this name. Having received, from different localities, suites of them, of different sizes, I notice that the "umbilicus small, orbicular, profound," of Say, exists only in young specimens, it being closed in the full grown shell.

It resembles the preceding species, but has one whorl less, is more depressed, and its base is more convex. The tooth in the aperture is sometimes so little prominent as to be hardly visible; at other times there are three teeth. The striæ of growth are fine and crowded, and seem to be more nearly at right angles with the suture than is usual in other species.

76. *HELIX LASMODON*, PHILLIPS.

PLATE XXXVII. FIGURE 2.

H. testâ parvâ, depressâ, umbilicatâ, corneâ, nitente; anfractibus septem, minutè striatis; aperturâ sub-circulari, intus lamellis dentiformibus duobus instructâ; labro simplici, acuto; basi glabrâ; umbilico lato, profundo.

SYNONYMS AND REFERENCES.

Helix lasmodon, PHILLIPS, Journ. Acad. Nat. Sc. VIII. 182, anno 1842.

DESCRIPTION.

Animal not noticed.

SHELL very much flattened above, a little convex; epidermis corneous, shining; whorls seven, narrow, very slowly increasing in diameter from the apex to the aperture, and not expanding at the aperture, with minute, transverse striæ and wrinkles; suture moderately impressed; lip thin, acute; aperture nearly circular, within, upon the base, are two prominent, white, testaceous laminæ, nearly parallel, and extending far into the cavity of the whorl; umbilicus large, rather expanded, and deep; base smooth, well rounded from the umbilicus to the circumference.

Greatest transverse diameter one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. It inhabits the northern parts of Alabama, and the eastern part of Tennessee, in the mountains.

REMARKS. I do not think it can be said to resemble any other native species. If the umbilicus were closed, it would be not unlike a very depressed form of *Helix gularis*; but the umbilicus is large for the size of the shell, and deep. It is a very pretty species.



77. *HELIX PERSPECTIVA*, SAY.

PLATE XXX. FIGURE 1.

H. testâ parvâ, orbiculato-depressâ, sub-discoideâ, latè umbilicatâ, rufescente; anfractibus convexiusculis, scabris, striis transversis elevatis, eminentibus; aperturâ sub-rotundatâ, depressâ, internè unidentatâ; labro simplici, acuto.

SYNONYMS AND REFERENCES.

Helix perspectiva, SAY, Journ. Acad. I. 18; Nich. Encyc. IV.

KIRTLAND, Ohio Report, 173.

SAGER, Michigan Catalogue, 14.

BINNEY, Bost. Journ. Nat. Hist. III. 430, pl. 21. f. 4.

DE KAY, New York Report, 31; Fauna, 42, pl. 3, f. 38.

FÉRUSAC Tab. Syst. 44; Hist. Nat. des Moll. pl. 79, f. 7.

DESHAYES, in Lamarck, VIII. 130.

CHEMNITZ, 2d ed. tab. 85, f. 30-32.

PFEIFFER, Monog. Helic. Viv. I. 104.

Helix parvula, DESHAYES, Encyc. Meth. II. 217.

Euryomphala perspectiva, BECK, Index, 11.

Patula perspectiva, HELD, in Isis, 1837, 916.

DESCRIPTION.

ANIMAL. Head and tentacles bluish-black; margin and posterior part of foot white. Foot transparent, narrow, less in length than twice the diameter of the shell, terminating acutely.

SHELL very much depressed, almost discoidal; epidermis reddish-brown, immaculate; whorls six, with numerous, elevated, strongly marked, transverse striæ; suture deeply impressed; umbilicus very much expanded, cup-shaped, exhibiting all the volutions; aperture rounded,

depressed, having within, a single tooth on the base ; lip simple, thin.

Greatest transverse diameter three-eighths of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States, and was noticed by Mr. Say in the North-western Territory. Mr. Bartlett found it in Tennessee, Kentucky, Arkansas, Georgia, and Virginia. It is commonly supposed to exist in Massachusetts and other New England States ; but, so far as my own observation extends, it is replaced in those States by *Helix striatella*, which it very much resembles.

REMARKS. This is a common shell in those parts of the country which it inhabits. In Ohio it is particularly abundant, vast numbers of them being sometimes found under the bark of a single decaying tree. The striæ of increase on the upper surface are remarkably prominent, and almost angular, and serve to distinguish it from every other species ; on the lower surface they are very distinct, but less prominent, and the direction of their curve is the reverse of that above : they converge into the umbilicus. It varies considerably in size, and young shells are often carinated. In mature individuals there is a single, sub-prominent tooth on the base of the shell, within the aperture. Some specimens are entirely white ; and, though thus bleached and deprived of color in the shell, the animal seems to be healthy and active.

It resembles *Helix rotundata*, Müller, but is destitute of the alternate markings of that species. There cannot

be a doubt that *Helix parvula*, Deshayes, is identical with this shell; as his description will not apply to any other than this species and *H. striatella*, and the angulated character of the striæ sufficiently point to this.

There is a *Helix* described under the same specific name by Wagner, in Spix's Testacea of Brazil; but as that did not appear until ten years after Mr. Say's publication, a new name must be adopted for the Brazilian species.

78. *HELIX MULTIDENTATA*, BINNEY.

PLATE LXVIII.

H. testâ minimâ, orbiculato-depressâ, umbilicatâ, tenuissimâ, pellucidâ, nitidâ, supra planulatâ; anfractibus sex, obliquè et minutè striatis; aperturâ semilunatâ, angustâ; labro simplici, acuto; umbilico parvo.

SYNONYMS AND REFERENCES.

- Helix multidentata*, BINNEY, Boston Journ. Nat. Hist. III. 425. pl. 22, f. 5.
ADAMS, Vermont Mollusca.
CHEMNITZ, 2d ed. tab. 101, f. 9-12.
PFEIFFER, Monog. Helic. Viv. I. 184.

DESCRIPTION.

ANIMAL rosy-white, thread-like.

SHELL depressed, sub-planulate above, very thin, pellucid; epidermis smooth, shining; whorls six, narrow, slightly convex, increasing but slowly in diameter, lines of growth hardly visible; suture impressed; aperture semi-lunate, narrow; lip acute; umbilicus very small,

rounded, not exhibiting any of the volutions; base convex, indented around the umbilicus. Two or more rows of very minute, white teeth, radiating from the umbilicus, are seen through the shell, within the base of the last whorl.

Greatest transverse diameter one-eighth of an inch.

GEOGRAPHICAL DISTRIBUTION. Noticed hitherto only in Vermont among the Green Mountains, and in the adjoining parts of New York.

REMARKS. This species possesses characters so marked that it, at first, is not likely to be mistaken for any other. The numerous narrow whorls visible on its upper and plane surface, while only one is seen below, together with its minute, round umbilicus, and narrow aperture, would sufficiently distinguish it; but there is another character still more peculiar. There are from two to four rows of very minute, delicate, white teeth, on the lower side of the interior of the last whorl, radiating from the centre. One row is usually so near the aperture as to be seen within it with the aid of a microscope; the others are more or less remote: each row contains from five to six distinct teeth. They are visible through the shell. The transparency of the shell is so great that frequently the sutures of the upper surface can be seen through it, when viewed on the base. With the living animal within, the shell has a roseate tinge. This beautiful little species has usually been considered to be very distinct in its characters; but recent observa-

tions have led to doubt. Specimens of the young of *Helix interna* resemble it so exactly, on the *lower* surface, that it is impossible to distinguish them except by counting the internal teeth, which in *Helix interna*, never, so far as I have noticed, exceed three in each row. The aperture of both is also the same, and the color not very different. The superior surface, however, shows considerable differences. The spire in this is flatter, the whorls are more numerous by at least one full volution, and it is smooth and shining, and entirely destitute of prominent ribs. It never attains one-fourth part of the bulk of that shell. Yet, notwithstanding these differences, the general aspect of the young of that species, and what are considered to be the mature of this, are so nearly the same, that it is difficult to refrain from considering them to be identical. If we ever know the modifications which are produced in the external characters of this genus, by the influence of external causes, it will very probably be found that this is only a variety of the preceding species. And that there will be, gradually, a fusion of received species into those which are typical and, as it were, central species, there can be no doubt.



79. **HELIX LINEATA.**

PLATE LXVIII.

H. testâ parvâ, discoideâ, supra planulatâ, subtus concavâ, corneo-virescente ; anfractibus quatuor, lineis parallelis, volventibus, sub-elevatis ornatis ; umbilico lato, expanso ; labro simplici ; fauce dentibus binis armato.

SYNONYMS AND REFERENCES.

Helix lineata, SAY, Journ. Acad. I. 18, II. 273.

KIRTLAND, Ohio Report, 173.

BINNEY, Bost. Journ. Nat. Hist. III. 436, pl. 22, f. 6.

DE KAY, New York Report, 31 ; Fauna, 44.

GOULD, Invertebrata, 179, f. 103.

ADAMS, Vermont Mollusca, 11.

FÉRUSAC, Tab. Syst. 44 ; Hist. pl. 79, f. 1.

CHEMNITZ, 2d ed. tab. 101, f. 13 - 15.

PFEIFFER, Monog. Helic. Viv. I. 184.

Euryomphala lineata, BECK, Index, 8.

DESCRIPTION.

ANIMAL whitish, transparent, threadlike.

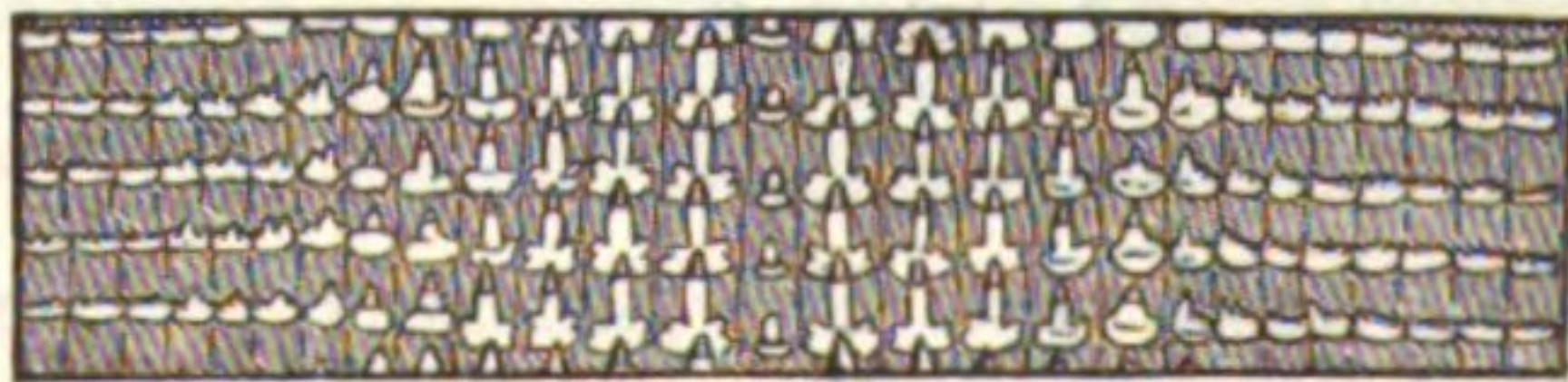
SHELL small, discoidal ; epidermis greenish ; whorls about four, visible on the base of the shell as well as above, with numerous equidistant, parallel, raised lines revolving upon them ; suture much impressed ; aperture semi-lunate, narrow, not expanding ; lip thin ; umbilicus wide, forming a concave depression of the base, each volution visible to the apex ; within the aperture, on the external circumference, are placed two pairs of minute, conical, white teeth, the first pair in sight when looking into the aperture, the other more remote.

Greatest transverse diameter one-eighth of an inch, usually less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northern, North-eastern, and Middle States, and those bordering upon the Ohio River. Common in Vermont.

REMARKS. This peculiar shell is distinguished by its discoidal form, greenish color, the fine revolving lines upon its whorls, and the singular teeth which are placed in the interior of the outer whorl. These teeth are arranged in pairs, on the external side of the parietes of the cavity, one of each pair being on the superior and one on the inferior part of the whorl. They are prominent, white, and conical, and may be discovered through the semi-transparent shell. One pair is so near the aperture as easily to be seen, on looking into it; the other is distant nearly one-half a volution from the lip, and is of course invisible except through the shell. At least one pair will be found to exist in every specimen, when carefully sought for: in one instance, I noticed a third pair still further within the whorl.

Noticed under the bark, or in the interstices of wet and decaying wood, and under layers of wet leaves, and stones, in damp places, in forests.



GENUS BULIMUS, AUCT.

GENERIC CHARACTERS.

ANIMAL. External form and characters corresponding, in all respects, to those of *Helix*, variously modified as to the proportion of the several parts, in different species. Its peculiarities consist in its internal organization, especially the genital apparatus.

SHELL. Form ovate, oblong, or turreted; structure sometimes thin and delicate, but generally thick and solid; surface smooth, very rarely folded or sculptured; color sometimes corneous, but generally more or less variegated; epidermis in some species extremely delicate, in others very thick and firm, and having an independent coloration. Aperture longitudinal, entire, ovate, simple, or dentate; lip disjoined above, either acute or reflected; columella straight, smooth, in a few species folded, never truncated at base. Operculum none.

GEOGRAPHICAL DISTRIBUTION. The *Bulimi* belong to the tropics and the immediate vicinity; and, though not strictly limited to that region, are seldom found elsewhere. Throughout this zone, they are found in every part of the world in some of their forms; though a particular form may prevail more exclusively in particular countries. Tropical America and the Philippine Islands, however, may be regarded as their favorite residences; while Africa and tropical Asia present us with but few

species. In North America the species are few in number, and the typical *Bulimi* are confined to its most southerly portion, none of them extending farther north than Tennessee ; and the species found in Florida and Texas are also common to the neighboring West India Islands, and to the more southerly Mexican territory. It is only the aberrant forms that are found in the Middle and Northern States.

REMARKS. The genus *Bulimus* was originally proposed by Scopoli, in 1777. As instituted by him, it applied, for the most part, to aquatic shells ; and as afterwards employed by Bruguière, it included shells which, though allied in form, were widely different in their natural affinities. One after another, new and well characterized genera were withdrawn from it ; until, under the judicious restrictions applied by Lamarck, it was left in such a condition as to be adopted, in the main, by most subsequent naturalists. But simplification did not stop here. The genus, as then left, was made up of species which varied so little in external characters, whether of the shell or the animal, from those of the genus *Helix* proper, — or, when they were so different from the typical form of that genus as to appear widely distinct at first sight, they were found to be connected by such an unbroken series of intermediate forms, — that some authors gave up the division, and united both the *Bulimi*, *Achatina*, and all the other *Helicidæ*, under the single genus *Helix*. Such was the course of Férussac, who, in his great work on the Mollusca, made only

subdivisions, and merely for the sake of convenience. This, however, was going to another extreme. For an examination of the internal organization of the animal has shown that there are essential differences in the structure of the reproductive and digestive organs, and in the parts within the mouth, not only to justify, but to demand, a separation into several genera. Still, the external characters are so similar, and so few species have been examined anatomically, that the precise line of demarcation between these genera, and especially in the case of the genera *Helix* and *Bulimus*, is not yet definitely settled.

The species of this genus coming within our province are so few, probably but a single species being truly native, that it would be quite out of place to attempt to settle a question so broad as that which is here involved. We shall, therefore, bring under this genus such of our shells as have been hitherto arranged under it, although two or three sub-genera, perhaps even true genera, are represented by them. *Bulimus lubricus*, for instance, seems to have little or no affinity with *B. dealbatus*, or even with *B. decollatus*, but is more likely to be congeneric with *Glandina*. *Bulimus harpa* belongs rather to the genus *Pupa*. But we will endeavor to give such details, respecting each species, as to afford additional material for the final adjustment of this difficult question.

1. BULIMUS FASCIATUS.

PLATES LV. LVI. LVII.

B. testâ conico-elongatâ, minutissimè striatâ, albâ, fasciis aut lineis aut maculis diversimodè coloratâ; anfractibus octonis, convexis; apice sæpè roseo; aperturâ sub-ovatâ; labro simplici, internè incrassato, acuto, aliquando crenato; columellâ plerumque albâ, interdum roseâ, sinuatâ sed non truncatâ, imperforatâ.

SYNONYMS AND REFERENCES.

- Buccinum fasciatum*, MÜLL. l. c. II. 145, anno 1774.
Bulla virginea, LIN., Syst. Nat. 1186.
Bulla fasciata, CHEMNITZ, l. c. IX. t. 117, f. 1004–1006.
Bulimus vexillum, BRUG. l. c. No. 107.
Helix vexillum, FÉRUSAC, Hist. pl. 121.
Achatina vexillum, LAM. 2d ed. VIII. 298.
Achatina crenata, SWAINS. l. c. pl. 58.
Achatina pallida, Ibid. pl. 41.
Achatina fasciata, Ibid. pl. 162.
 REEVE, Conch. Syst. II. 178, f. 12.
 D'ORB., Moll. Cub. I. 172, pl. 6, f. 1–7.
 PFEIFFER, Monog. Helic. Viv. II. 245.
Achatina solida, SAY, Journ. Acad. V. 122.
 LISTER, Icon. l. c. t. 12, f. 7; GUALT, l. c. t. 6, f. C. D.
 D'ARGENV., l. c. pl. 11, f. M.

DESCRIPTION.

ANIMAL dark brown, or chocolate color, over the whole body. Surface very prominently granulated. Superior tentacles very long when extended, thick at their base, ocular points black and small; lower tentacles long, conical, rounded at the extremities. Collar lead-color. Extremity of foot usually rounded. When in motion, the

whole foot glides smoothly forward, without any perceptible alternate motion of the margins.

SHELL conical, rather thick, smooth, shining, minutely striated; whorls seven to eight, convex, decreasing in diameter gradually and regularly from the body-whorl to the apex; suture impressed; apex obtuse, commonly white, sometimes rosy; aperture sub-oval, purely white internally, sometimes with a thickened ridge within, and parallel to the outer lip; lip acute, sometimes crenate; columellar margin with a thin callus, sometimes rosy; columella sub-truncate in the young, entire in the mature shell, imperforate. Surface beautifully variegated with broad, entire or interrupted bands, lines, and spots of brown, with bands and lines of green and yellow, and with lines of rufous, revolving upon the whorls from the apex to the aperture, but more distinct upon the outer whorls. A single system of coloring prevails in some shells, while in others there is a mingling of all of them upon the same specimen.

Extreme length of axis 2.20 inches; extreme diameter of body-whorl one inch, ordinary diameter less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the southern part of the peninsula of Florida, and the islands and Keys adjacent to the coast. It is found abundantly at Key-West, and in the vicinity of Cape Florida.

REMARKS. This is one of several strictly local species, living in a climate and upon a soil differing from those of any other portion of the country, which are

evidently due to the geographical proximity of their locality to the island of Cuba. It occupies only the extreme end of the peninsula, and the nearest islands, whose shores are washed by the gulf stream which has already swept by the northern coast of Cuba. Many of the varieties of coloring and marking common to Cuban specimens may be noticed among the Florida shells; but there is one well defined variety, which, so far as we know, is peculiar to Florida. This variety is longer and less ventricose than the others, and its aperture is less ample. Upon a ground of pure white it is marked upon the body whorl, and above and below the sutures, with broad, ill defined, pale yellow bands. The apex and aperture are always white. The yellow bands are sometimes confluent or nearly so, and the yellow color appears to be diffused over the whole surface; more rarely the shell is entirely white. The columella is only slightly folded, and the lip is not crenate. The shell is somewhat thick. The variety is constant; and Mr Say, supposing it to be a distinct species, called it *Achatina solida*, from the last named character.

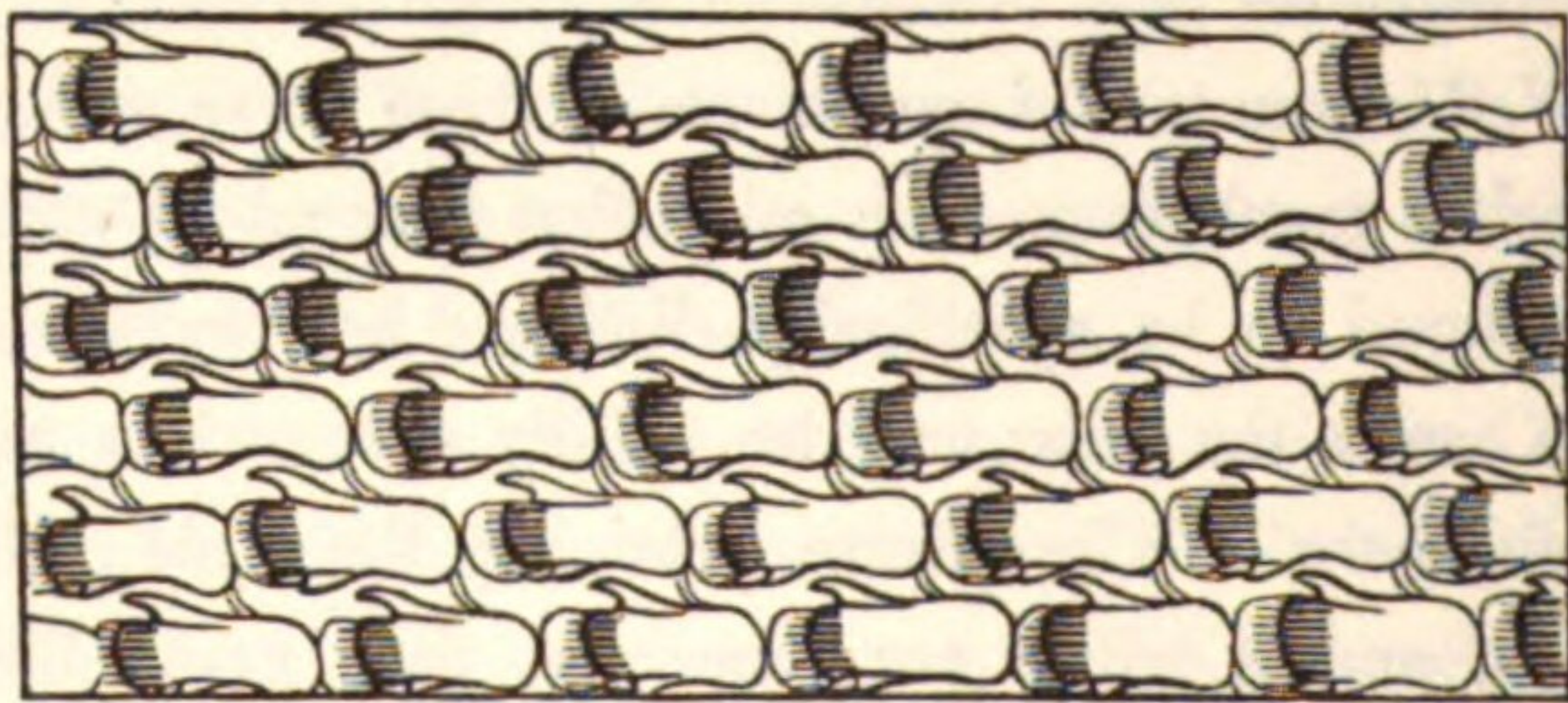
There are two other varieties, existing also in Cuban specimens, which are well marked. The first is distinguished by grass-green lines, more or less numerous, and of greater or less diameter, and by narrow bands of the same color, revolving upon a white ground. They are more numerous and more distinct upon the body whorl, and become almost obliterated on the posterior whorls; they are often undulating, and differ in the intensity of

the color. The lip, at the points where the lines terminate, is crenate, or notched ; which peculiarity has suggested one of the synonyms of the species. The axis is usually shorter than in the preceding variety ; and, consequently, the body whorl and aperture are larger in proportion to the whole magnitude of the shell ; the columella is also more folded and thickened. The aperture is white. The other variety is marked by broad, entire or interrupted, bands or blotches of deep brown. These sometimes cover nearly the whole surface, at other times they are broken into irregular spots, which are arranged above and below the sutures. The apex and columellar margin are rosy ; and so closely connected are these two characters with the presence of the brown color on the surface, that if a single spot or line of it is seen externally, the columellar margin will be pretty certainly found to be rosy. The columella is more prominently folded and thickened than in either of the other varieties.

Well characterized specimens of these three varieties differ so much from each other that they might well be considered to be specifically distinct ; but the passage from one to the other may be readily detected in some specimens. We see some retaining the wide yellow bands, amidst which are numerous, fine, green lines ; this shows the connection of the two first named varieties ; but such specimens are comparatively rare. On the other hand, specimens are much more common exhibiting the broad brown bands or blotches, upon the superior part of the spire, while the last, and perhaps the penultimate, whorls are marked with green lines alone.

The columella is sometimes prominently plaited and thickened; and the outer lip joins it at an obtuse angle; but it is never truly truncated. In young shells there is a more near approach to a truncation; and a distinct angle or carina may also be noticed on the body whorl.

This species inhabits trees, upon the branches of which it is found. In winter it hibernates by attaching its aperture very strongly to the bark of the tree, by means of a thick, viscid, opaque secretion, which hardens to the consistency of glue. In tearing it away, the bark or the shell is fractured sooner than the secretion. At other times, when the animal withdraws into the shell, it secretes only a thin, transparent epiphragm.



2. BULIMUS ZEBRA.

PLATES LII. LIII. LIV.

B. testâ sub-conicâ, glabrâ, albidâ, strigis fuscis longitudinalibus undatis ornatâ, aliisque transversis cinctâ ; anfractibus sex vel septem, ultimo magno, convexo ; columellâ integrâ, imperforatâ ; labro simplici, acuto, fusco aut nigro.

SYNONYMS AND REFERENCES.

- Buccinum zebra*, MÜLLER, l. c. II. 138, anno 1774.
Bulla zebra, GMEL., l. c. 3431, No. 31.
Zebra Mülleri, CHEMNITZ, IX. tab. 118, f. 1015 - 16.
Bulimus zebra, PFEIFFER, Monog. Helic. Viv. II. 143.
 REEVE, Conch. Icon. fig. 90.
Bulimus undatus, BRUG. l. c. No. 38.
Helix undata, FÉRUSAC, Hist. pl. 114, f. 5, 8, pl. 115.
Bulimus undatus, LAMARCK, 2d ed. VIII. 223.
 D'ORBIGNY, l. c. Moll. 264.
 VALENC. l. c. II. 245.
Bulimus melanocheilus, Ibid. II. 246.
Achatina pulchella, SPIX, l. c. pl. 9, f. 3.
Bulimus princeps, BRODERIP, in Sow. l. c. pl. 27, No. 18.
Achatina flammigera, SAY, Journ. Acad. V. 122.
Helix undata, MORICAND, l. c. VII. 423.

DESCRIPTION.

ANIMAL thick and massive, dirty, or yellowish white, darker on the middle of the back ; surface rugose, with prominent, oblong glands, and deep furrows. Whole length, exclusive of tentacles, three inches. Superior tentacles, when fully extended, one inch long, bulbous, with small, black, ocular points ; lower tentacles one-fifth of an inch long, slender. Orifice of generation behind lower tentacle on the right side. Mantle somewhat

bi-lobed protruding beyond the aperture, and slightly reflected. Posterior extremity rounded, sides corrugated, lower surface smooth, squalid.

SHELL sub-conical, smooth, incremental striæ fine, whitish, with longitudinal, irregular, undulating, or somewhat zigzag, dark-brown bands and clouds, intersected by straight, revolving lines of the same color; the body-whorl often with one or more straight, brown lines, at irregular intervals, indicating the former margins of the aperture. Whorls six to seven, diminishing in diameter rapidly, body whorl capacious, occupying two-thirds of the whole length of the shell. Aperture ample, ovate, showing the external colors within. Lip simple, acute, bordered with dark brown, or black, both internally and externally. Columellar margin with a thin, brownish callus; columella slightly thickened, not reflected, nor truncate, making a continuous curve with the lip, imperforate.

Common length of axis about two inches, diameter of large whorl rather more than one inch.

GEOGRAPHICAL DISTRIBUTION. Within the United States proper, we are only certain of the existence of this species in the southern part of the peninsula of Florida, and the islands adjacent. It is said to have been found in the southern part of Louisiana.

REMARKS. This shell is one of very wide diffusion on this continent. It is asserted by M. D'Orbigny, that it

inhabits all the territory of Brazil, and is found in the central forests of the whole of the warm regions of South America north of Brazil, and in the northern part of Peru. We have specimens from Honduras and Central America. It is described by Valenciennes among the shells of Mexico collected by Humboldt and Bonpland; is said to be found in Texas; is abundant on the island of Cuba, whence it has extended to Florida. There can hardly be a doubt that it is found at others of the Antilles, and around the whole Gulf of Mexico, with the exception of the interval between Texas and the extremity of Florida. Its range is from 20° to 24° north and south of the equator, making a total of 48° . Inhabiting so extensive an area, it consequently presents many varieties of coloring and form; and hence the numerous synonyms which have been applied to it. Mr. Say seems to have had no knowledge of it himself, but, from the verbal descriptions of others, was induced to believe the Florida variety to be identical with *H. flammigera* of M. Férussac.

The Florida specimens are usually thin, rather short and ventricose, and never exceed two inches in length. They are marked as described above. The most beautiful form of the species is that figured in plate LIV, a.; It is quite thick and ponderous; its general color is deep brownish, variegated with undulating intervals of white on the spire, and others more obscure on the columellar side of the body-whorl. On the side opposite to the aperture, the brown color is relieved only by three indistinct

and ill-defined dark bands, and by the black line showing the margin of a former lip. The columella is considerably thickened and folded; and the columellar margin is covered by a black callus; and the lip is broadly margined internally with black: further in, the aperture is purely white.

This species inhabits trees. It attaches itself to the tree during hibernation, and covers its aperture by an opaque, inspissated, glutinous secretion, which, though exposed to wind and rain, forms a perfect adhesion and protection to the animal, and only yields to its own solvent powers on the approach of spring. It exists in great numbers; and the dead shells are a favorite habitation of a species of hermit crab.

3. *BULIMUS SERPERASTRUS*, SAY.

PLATE L. FIGURE 2.

B. testâ ovato-fusiformi, tenui, umbilicatâ, albidâ fasciis inequalibus fusco-violaceis interruptis ad sex cinctâ; spirâ acuminatâ; anfractibus ad septem convexiusculis; suturâ lineari; aperturâ angustâ, lunatâ, spirâ breviorē; labro acuto, expanso, albo; columellâ supernè dilatatâ, haud appressâ; fauce fasciato.

SYNONYMS AND REFERENCES.

Bulimus serperastrus, SAY, Dissem. &c.; New Terr. & Fluv. Shells, 25.

PFEIFFER, Monog. Helic. Viv. II. 102.

REEVE, Conch. Icon. pl. 40, fig. 252.

Bulimus nitelinus, REEVE, Conch. Icon. tab. 69, fig. 398.

Bulimus lilacinus, REEVE, Conch. Icon. tab. 74, fig. 532.

DESCRIPTION,

ANIMAL not known.

SHELL elongate, ovate, even fusiform, thin, with delicate lines of increment, yellowish white, with about six unequal, interrupted, sometimes coalescent, bluish-black bands on the large whorl, three of which are continued on the upper whorls. Whorls six or seven, slightly convex, with a fine, well-marked suture. Aperture less than half the length of the shell, lunate, one half longer than wide, rather acute at base; lip sharp, expanded, its columellar portion widening upwards, and protecting a moderate-sized umbilical opening; columellar margin straight. The bands of the exterior reappear, in still deeper colors, in the fauces, but terminate at some distance short of the lip, which is white, or tinted more or less rose-color.

Length of axis an inch and a half; diameter seven tenths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in the region of Vera Cruz, Mexico, and also in Texas.

REMARKS. This shell belongs to a group of which there are numerous closely allied species, or else is a species of which there are numerous varieties. From the knowledge we have of the tendency to variation in some other species inhabiting the same region, we should be inclined to the latter opinion. Others, it appears, have thought differently, and have described them as distinct species. According to our view, we have placed two of Mr. Reeve's species among the synonyms to Mr. Say's species, and should even be disposed to add to them his *B. meridanus*, and *B. Californicus*, and also the *B. Vin-*

centinus of Dr. Pfeiffer. The distinctions given seem to be mostly drawn from the number of the bands, and the greater or less ruddiness of the lip and aperture, and not from the more essential characters of form and sculpture.—[G.]

4. **BULIMUS DEALBATUS, SAY.**

PLATES LI. LI. *a*. LI. *b*.

B. testâ conicâ, ventricosâ, perforatâ, glabrâ, albâ, strigis cinereis longitudinalibus irregulariter notatâ ; anfractibus sex vel septem, ventricosis ; aperturâ ovali ; labro simplici, acuto, ad columellam sub-reflexo, intus sub-incrassato.

SYNONYMS AND REFERENCES.

Helix dealbata, SAY, Journ. Acad. II. 159.

Bulimus dealbatus, POTIEZ & MICH. Galerie, I. 139, pl. 13, f. 3, 4.

PHILIPPI, Icon. I. p. 158, pl. 2, f. 6.

PFEIFFER, Monog. Helic. Viv. II. 187.

REEVE, Conch. Icon. fig. 455.

Bulimus dealbatus, BECK, Index, 72.

Zebrina dealbata, HELD, in Isis, 1837, p. 917.

Bulimus alternatus, SAY, Dissem. &c. ; Des. of New Terr. Shells, &c. 25.

DESCRIPTION.

ANIMAL not observed.

SHELL conical, rather ventricose, white, with longitudinal lines and blotches of ash ; whorls six to seven, ventricose, acuminate ; suture impressed, aperture oval ; lip acute, a little thickened within, somewhat reflected at its columellar portion, and partially hiding the umbilicus. Umbilicus open, small, rather deep.

Length of axis one inch, commonly three-fourths. Diameter of last whorl half an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Alabama, where it appears to be abundant. Was noticed by Mr. Say in Missouri, and has been brought from Arkansas, Texas, and Mexico.

REMARKS. This very pretty species seems to be rather widely distributed, and is very abundant in some places. Mr. Nuttall informed me that its remains literally covered the ground in some localities in Alabama. It varies widely in form, being sometimes elongated and slender, and at others short and ventricose. It is usually thin and somewhat fragile; but I have specimens from Texas which are thick and heavy, having a considerable testaceous deposit between the columellar and external extremities of the lip, and a thickened margin within the lip. The columella is also sometimes strongly folded; and the umbilicus is more or less closed. The longitudinal lines and blotches of darker color are occasioned by the parts of the shell which are transparent. As it grows older, it becomes uniformly opaque and white.

By some this is supposed to be identical with *Bulimus radiatus* of Europe. I have never seen a specimen which authorized this opinion in my view; and the figures of that species everywhere indicate a much less ventricose shell.

[The large and solid Mexican and Texan specimens, which have been above noticed as varieties, have been

designated as distinct species by other authors, and probably with justice. *B. Schiedeanus*, Pfeiffer, answers to our Pl. LI. *b.*; and *B. lactarius*, Menke, to Pl. LI. *a.*; and this latter, Dr. Binney seems to have regarded as the *B. alternatus* of Say. There are other names given, which, if not applied to really identical species, are very closely allied: such are *B. pruinus*, Sowb., *B. liquidabilis*, Reeve, and *B. Dunkeri*, Pfeiffer.—G.]

5. *BULIMUS VIRGULATUS*, FÉRUSSAC.

PLATE LVIII.

B. testâ tenui, vix umbilicatâ, oblongo-ovatâ, politâ, lutescente, lineâ suturali et strigis longitudinalibus zonisque castaneis multimodis pictâ; anfractibus ad septem convexiusculis; aperturâ ovatâ, labro acuto, columellâ rectâ, supernè dilatatâ.

SYNONYMS AND REFERENCES.

Helix (Cochlogena) *virgulata*, FÉRUSSAC, Hist. Moll. pl. 142, B. f. 1-7.

Bulimus Caribbæorum, LAMARCK, Animaux sans Vert. 2d ed. VIII. 233.

Bulimus multilineatus, SAY, Journ. Acad. Nat. Sc. V. 120, anno 1825.

PFEIFFER, Monog. Helic. Viv. II. 204.

Bulimus Menkei, GRUNER, Wiegman. Archiv. 1841.

Bulimus venosus, REEVE, Conch. Icon. pl. 45, fig. 285, Oct. 1848.

DESCRIPTION.

SHELL thin and strong, elongated, ovate-acuminate, smooth and shining, of a bright yellowish white color, variegated with longitudinal stripes and spiral zones of dark chestnut, of various widths, none of which are constant except a sub-sutural line, continued to the apex,

which is also black. Whorls about seven, a little convex; suture delicate; aperture rounded-ovate, a little more than one-third the length of the shell; lip acute; columella straight, widening upwards, and protecting a minute umbilical opening.

Length of axis one inch; diameter two-fifths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found at Key West, East Florida.

REMARKS. *B. virgulatus* is a species very variable in its form and coloring, inhabiting many of the West India Islands, and deserving of the local name applied to it by Lamarck. If it has any constant character in coloration, it would seem to be its piceous columella. As to the shell above described, it was regarded by Dr. Binney as a variety of this species; and the plate was engraved and lettered accordingly. But it seems rather to be entitled to a specific rank, on account of its thinner and more polished, ivory-like structure, its proportionally shorter and more rounded aperture, and its coloring.

Mr. Say's description of *B. multilineatus*, corresponds with our shell, except in size, and, indeed, agrees exactly with an immature specimen in our collection. If it be a distinct species it should bear his name. It is unquestionably the shell described by Reeve under the name of *B. venosus*. From Mr. Reeve's delineations and the specimens in our possession, it would seem that its characters are constant. He has expressed some doubt as

to the locality of his species ; and I think the doubt may also be applied to our specimens. Though brought from Key West, they might have been accidental stragglers, even from the South American continent ; or they might have been obtained from some collector who had given a wrong locality.—[G.]

6. BULIMUS DECOLLATUS, LIN.

PLATE L. FIGURE 1.

B. testâ imperforatâ, cylindrico-turritâ, corneo-albidâ ; spirâ cylindraceâ, truncatâ ; aperturâ ovali, supernè angulatâ ; labro simplici, intus incrassato.

SYNONYMS AND REFERENCES.

Helix decollata, LIN. Syst. Nat. 1247.

MÜLLER, Verm. Hist. II. 114.

Bulimus decollatus, DRAP. 76, pl. 4, f. 27.

DESHAYES, in Lamarck, VIII. 229.

ROSSMÄSSLER, Icon. 5-6 ; Hest 45, pl. 28, f. 384.

Bulimus multilatus, SAY, Journ. Acad. II. 373.

Bulimus mutilatus, JAY, Catal. 1839, 56.

PFEIFFER, Monog. Helic. Viv. II. 153.

REEVE, Conch. Icon. pl. 51, fig. 331.

DESCRIPTION.

ANIMAL. Body short, extending but little behind the aperture, blackish, or bluish-black on the head and back, with decidedly green reflections in certain lights, the sides and posterior extremity olivaceous ; surface finely granulated ; upper tentacles slender and rather short ; ocular points very small ; lower tentacles very short.

It is very voracious in its habits. The shell is carried nearly horizontally when in motion.

SHELL rather thick, long, cylindrical, turreted; epidermis shining, whitish, with a slight tint of brownish or yellowish; apex obtuse; spire gradually enlarging from the apex to the aperture, commonly abruptly truncated between the third and fifth whorls next the aperture; whorls remaining three to five, flat, a little wrinkled, and in the last two or three slightly crenate, or plaited below the suture; suture not impressed; aperture lateral, oval, angulated superiorly, its plane very nearly parallel with the axis of the shell; lip simple, thickened within, its columellar portion reflected.

Axis of the truncated shell usually about one inch; diameter of the largest whorl less than half an inch.

GEOGRAPHICAL DISTRIBUTION. The only locality in the United States, which I am acquainted with, is the city of Charleston, S. C. where it is very abundant in gardens. Its introduction from Europe probably occurred at no very distant period. It was first observed by Dr. Edmund Ravenel, in 1813.

REMARKS. The young shell is thin, transparent, and fragile; the old is opaque and rather thick. It is very peculiar in respect to the manner of breaking off and abandoning successive portions of the spire. According to the plan upon which the shell is projected, it would, when it reaches the full size which it attains in this

country, possess ten or more full volutions, if it retained all of them from the apex downward. But as fast as the growth of the animal compels it to increase the number and volume of the whorls, it releases its connection with the superior whorls, creates a new attachment lower down, forms a new apex or spiral calcareous septum, which separates it from the abandoned part; and, in some manner which is not understood, breaks and throws off those whorls which are no longer of use. This commences at a very early period; the original apex being thrown off when the shell has acquired five or six whorls. They differ, in this particular, from the land shells, and especially from the *Helices*, which always, so far as I know, retain their original attachment to the apex of the shell.

It has been thought that the breaking of the spire, after being left by the animal, and becoming dry and brittle, is accidental; but I conceive that the effect is much too constant to be accounted for in that way. I have never been able to find a mature specimen with the apex. And in all the various countries which it inhabits, including the whole southern part of Europe, the northern part of Africa, the islands of the Mediterranean, the Canaries, Madeira, &c., the same peculiarity attends it. If it were only an accident, some few in this wide extent might escape. I doubt not, therefore, that it is effected by the action of the animal itself. It may be that the calcareous matter of the shell is absorbed at the point of division, previous to the formation of the new septum.

Mr. Say made out his description from an immature specimen.

The epiphragm is white, pearly, and opaque ; it fills up the aperture, and when pushed out by the animal, generally falls entire. It may be seen in numbers about their winter quarters. Its outline is represented.

7. BULIMUS LUBRICUS, MÜLLER.

PLATE LII. FIGURE 4.

B. testâ parvâ, ovato-oblongâ, imperforatâ, pellucidâ, corneâ, lævi, nitidissimâ ; aperturâ ovali ; labro simplici.

SYNONYMS AND REFERENCES.

Helix lubrica, MÜLLER, Verm. Hist. I. 104.

Bulimus lubricus, DRAP. 75, pl. 4, f. 24.

DESHAYES, in Lamarck, VIII. 239.

SAY, Exped. St. Peter's, II. 259.

GOULD, Invertebrata, 193, f. 124.

ADAMS, Vermont Mollusca, 7.

Achatina lubrica, MENKE, Synop. 2d ed.

PFEIFFER, Monog. Helic. Viv. II. 272.

Zua lubrica, LEACH, Moll. p. 114.

Cionella lubrica, JEFFREYS, Linn. Trans. XVI. 327.

Columna lubrica, JAN, Catal. 5.

Stylodes lubricus, FITZINGER, Syst. 105.

For other synonyms, see PFEIFFER's Monograph, and GOULD's Invertebrata, &c.

DESCRIPTION.

ANIMAL. Head, back, and tentacles blue-black, foot paler, shorter than the shell ; lower tentacles short.

SHELL small, thin, transparent, oblong-oval ; epidermis smoky horn-color, smooth, very bright and shining ; whorls five or six, somewhat rounded ; apex obtuse ; suture somewhat impressed ; aperture lateral, oval, its

plane nearly parallel with the axis of the shell ; lip simple, thickened, often slightly rufous ; umbilicus imperforate.

Length of axis three-tenths of an inch ; diameter of last whorl one-tenth.

GEOGRAPHICAL DISTRIBUTION. Has been noticed in the Northwestern Territory, near the Lake of the Woods and Lake Winnipeg, in Ohio, in all the Middle States, and in every State of New England.

REMARKS. This little species, which is hardly larger than a grain of wheat, is certainly identical with the European shell. It is distributed over a vast expanse of country, and exists in immense numbers in certain favorable localities. Its usual place of abode is under leaves and the bark of decaying trees, in forests and groves. Its surface has a peculiarly brilliant reflection, which excels that of any other of our shells ; and hence it has been known in France as "la brillante." It is supposed by some to be the *H. sub-cylindrica* of Linnæus : if it should prove to be so, that specific name should obtain ; but the description of Linnæus leaves much room for doubt. There is a slight sinuosity at the union of the lip with the columella, rendering the aperture a little effuse at this point, and approximating the shell to the genus *Achatina*. This, and its other departures from the typical *Bulimi*, have caused it, in several instances, to receive a generic distinction. Dr. Leach first indicated it as a separate genus, under the name *Zua*.

8. BULIMUS SUBULA, PFEIFFER.

PLATE LIII. FIGURE 4.

Testâ turrîto-subulatâ, sub-perforatâ, tenui, striatulâ, nitidulâ, diaphanâ, albidâ vel cereâ ; anfractibus octo convexis ; aperturâ oblongâ, ovatâ ; labro simplici ; columellâ rectâ, reflexâ.

SYNONYMS AND REFERENCES.

Achatina subula, PFEIFFER, Wieg. Archiv. 1839, I. 352.

Bulimus subula, PFEIFFER, Symbolæ, I. 85 ; Monog. Helic. Viv. II. 158.
REEVE, Conch. Icon. pl. 69, fig. 494.

Bulimus octonoides, D'OREIGNY, Moll. Cub. I. 177, tab. 11, f. 23, 24.

Bulimus procerus, ADAMS, Proc. Bost. Soc. Nat. Hist. II. 13.

DESCRIPTION.

SHELL small, elongated, turreted, transparent, with delicate, longitudinal striæ, sometimes of a spermaceti white, and sometimes wax-yellow. Whorls about eight, convexly rounded, revolving more closely at apex than elsewhere, so as to form a somewhat obtuse summit, the last whorl less than one-third the length of the shell ; suture deeply impressed, aperture elongated, narrow, rhomboid-elliptical ; lip simple and regularly curved ; columella nearly straight, reflexed, protecting a minute umbilical perforation.

Length of axis nearly half an inch ; diameter about one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Florida abundantly, under fallen leaves, and also in most of the West India islands.

REMARKS. This species belongs to a somewhat numerous group found in the tropics, wherever the banana and other Musaceæ flourish; some of which have the columella truncated, and are arranged under the genus *Achatina*, like *A. octona*, though by their natural affinities they are clearly associated. The banana and plantain have, by transplantation, become naturalized throughout the tropics; and it is highly probable that many shells found with them, which have received different names merely because they have been found in localities far remote from each other, are really identical. This shell is considerably smaller and more rapidly tapering than *A. octona*, which has its columella somewhat truncated, and has not as yet been found on this continent.

9. BULIMUS EXIGUUS, SAY.

PLATE LIII. FIGURE 1.

B. testâ minutissimâ, albâ, fusiformi, sub-acuminatâ; anfractibus quinque vel sex, obliquis, convexis; aperturâ obliquâ; columellâ dente albo ornatâ; labro albo, reflexo.

SYNONYMS AND REFERENCES.

Pupa exigua, SAY, Journ. Acad. II. 375.

GOULD, Boston Journ. III. 398, pl. 3, f. 20.

Invertebrata, 191, f. 120.

DE KAY, New York Report, 31; Fauna, 49, pl. 4, f. 46.

ADAMS, Vermont Mollusca, 8.

DESCRIPTION.

ANIMAL colorless; tentaculæ stout, hyaline, one-third the length of the foot, the upper pair alone developed.

The foot is short, thick, distinctly divided into two segments, the anterior of which is bilobed, and projects, when the animal is in motion, considerably in advance of the head. Eyes oval, situated on the back, near the base of the tentacles. Its motions are very sluggish. It carries the shell directed horizontally, which is so transparent that the viscera of the animal may be seen through it.

SHELL elongated, tapering at both ends, white, translucent, shining; apex rather obtuse; whorls five to six, convex, very oblique, with transverse striæ; suture distinct, impressed; aperture obliquely oval, white, with a prominent plait on the columellar margin, about midway between the extremities of the lip, and a slightly prominent fold near the junction of the lip with the umbilical extremity of the shell; lip thick, reflected, flattened; umbilicus perforated.

Length one-fifteenth, breadth one-fortieth of an inch.

GEOGRAPHICAL DISTRIBUTION. Common in all the Northern and Middle States. It has also been found in Ohio and Arkansas.

REMARKS. The extreme minuteness of this shell has doubtless prevented its being noticed in many localities where it exists. It probably inhabits a very wide range of territory. The plane of the aperture is not so nearly parallel with the axis as in the preceding species. It has been said to resemble *Carychium minimum* of Müller; but neither the figure nor description, as given by

Draparnaud, correspond with our shell. It is found under stones and fragments of wood, and especially among moss, in damp places.

[This shell should be removed to another family, under the name of *Carychium exiguum*. Besides the peculiar structure of the shell, and the form of its aperture, the position of the eyes of the animal plainly remove it from the true *Helicidæ*, and associate it with the *Auriculidæ*. Its habits, and the characters of the shell, also indicate the same relation. Thus, the validity of the genus *Carychium*, instituted from the shell alone, and its true position assigned to it by Gray, is fully sustained by the character of the animal.—G.]

10. BULIMUS FALLAX, GOULD.

PLATE LII. FIGURE 1.

P. testâ fusiformi, acuminatâ, corneo-rufescente; anfractibus sex, convexis; aperturâ sub-rotundatâ, edentulâ; labro albo, latè reflexo; umbilico perforato.

SYNONYMS AND REFERENCES.

Cyclostoma marginata, SAY, Journ. Acad. II. 172.

Pupa fallax, GOULD, Invertebrata, 192, f. 123.

Bost. Journ. Nat. Hist. IV. 357, pl. 16, f. 15.

DE KAY, New York Fauna, 51, pl. 35, p. 331.

PFEIFFER, Monog. Helic. Viv. II. 309.

Pupa albilabris, ADAMS, Vermont Mollusca, 8; Sillim. Journ. XL. 271.

DESCRIPTION.

ANIMAL. Head, neck, and tentacles black, posterior

and lower parts lighter ; upper tentacles long and slender, lower very short.

SHELL fusiform, regularly diminishing in volume from the body-whorl to the apex, smooth ; epidermis brownish horn-color ; whorls six, very convex, striæ of growth hardly apparent ; suture well impressed ; aperture lateral, rounded oval ; lip white, rather broadly reflected ; umbilicus perforated.

Length of axis one-fifth of an inch ; diameter of shell one-fifteenth.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northern, Middle, and Western States. It has also been found in South Carolina.

REMARKS. This is readily distinguished from the other species by its white, broadly reflected, and flattened lip, which surrounds the whole aperture, except a small portion which is interrupted by the body-whorl. It resembles a *Cyclostoma*, but has a membranous epiphragm. The aperture is entirely destitute of teeth, and opens laterally, or upon the side of the shell, its plane being parallel with the axis of the shell. The umbilicus is distinctly perforated.

The specific name by which Mr. Say first described this shell being preoccupied in this genus, his second name, applied to a variety, of course takes precedence, and there is no occasion for another.

11. BULIMUS HARPA.

PLATE LII. FIGURE 3.

B. testâ minimâ, conicâ, obsoleto-scalariformi, tenui; anfractibus quatuor, convexis; aperturâ sub-circulari, sub-obliquo; labro acuto; axe minutè perforato.

SYNONYMS AND REFERENCES.

- Helix harpa*, SAY, Exped. St. Peter's, II. 256, anno 1824.
Pupa costulata, MIGHELS, Proc. Bost. Soc. Nat. Hist. I. 187.
Pupa ? ANON. Am. Journ. Sc.
Bulimus harpa, PFEIFFER, Zeitschr. für Malak. 1847, 147.
Monog. Helic. Viv. II. 150.

DESCRIPTION.

ANIMAL not hitherto noticed.

SHELL ovate-conic, scalariform, light yellowish horn-color, thin and fragile; whorls four, convex, the last two ribbed with thin, prominent plates, the first two smooth; suture distinct; aperture sub-circular, slightly oblique, unarmed; lip simple and thin, or modified by the last rib; axis minutely perforated.

Length of axis one-fifth of an inch; diameter one-seventh of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Northwestern Territory and the State of Maine. It has not been noticed in the country intervening between these two extremes, though it doubtless may be found.

REMARKS. This species, described by Mr. Say under the name which we have adopted, was discovered by him

in the North-western Territory, and was published and figured in the Appendix of the Narrative of the Expedition to the St. Peter's River, in 1824. From that date until the year 1844, it remained unseen by naturalists, and was regarded as a species of doubtful authenticity. An anonymous writer in the American Journal of Science supposed that it was the immature spire of a species of Pupa; an opinion that seemed to be confirmed by reference to Mr. Say's figure. In the last named year, however, it was rediscovered by Dr. Mighels, under damp leaves, in company with *Helix arborea*, *lineata*, and *striatella*, in a grove of oaks in Portland, Maine; a locality a thousand miles distant from the original place of discovery. It proves to be a distinct and well characterized species, not liable, when once seen, to be confounded with any other.

GENUS ACHATINA, LAMARCK.

GENERIC CHARACTERS.

ANIMAL. In its external form and characters, it agrees with the animal of *Helix* and *Bulimus*.

SHELL. Form ovoid or turreted, generally thin and delicate in structure, sometimes transparent, oftentimes reversed. The aperture is ovate, more or less elongated; the lip is simple, and sometimes a little everted, but never reflexed. The columella is usually plain and rounded, but in some groups it is contorted, or bears a lamella

which revolves within the aperture ; and its base is more or less truncated, so as to form a basal notch. Operculum, none.

GEOGRAPHICAL DISTRIBUTION. This is a tropical, and, properly speaking, an African genus, all the typical species being obtained from that continent or the neighborhood. Some of the aberrant forms of the Lamarckian genus are found elsewhere ; as on the European coast of the Mediterranean, at the Sandwich Islands, at the West India Islands, etc.

REMARKS. The genus as characterized by Lamarck, included shells of widely different natural characters. The typical species differ from *Bulimus* merely by the truncation of the columella ; and this varies in degree till we come to species on the boundaries of either genus. The aberrant groups have been, more recently, withdrawn from the genus, under the names *Glandina*, *Achatinella*, *Tornatellina*, etc., which are now regarded as generically distinct. *Bulimus fasciatus* has usually been placed under this genus, and is a fair example of the inosculation of the genera *Achatina* and *Bulimus*. The truncation of the columella, which is the grand mark of distinction, is sometimes very decided, and at others is nearly imperceptible. The two shells which have been placed under this genus in the first part of this work, might with more propriety be arranged elsewhere ; and we shall therefore not dwell further on the various modifications of the genus, but reserve further observations for the special descriptions.—[G.]

1. ACHATINA GRACILLIMA, PFEIFFER.

PLATE LIII. FIGURE 3.

T. imperforatâ, subuliformi, tenui, albidâ, costulis remotis, longitudinalibus acutis ornatâ ; spirâ ad apicem obtusâ, anfractibus ad octo planulatis, suturâ profundâ discretis, ultimo subangulato ; aperturâ sub-rhombeâ, ad basim sub-canaliculatâ ; labro simplici, incumbente ; columellâ rectâ.

SYNONYMS AND REFERENCES.

Achatina gracillima, PFEIFFER, in Wieg. Archiv, 1839, I. 352.

Bulimus gracillimus, PFEIFFER, Symbolæ, III. 54.

Monog. Helic. Viv., II. 160.

Achatina striato-costata, D'ORB., Moll. Cub. I., 176, pl. 11, f. 19-21.

DESCRIPTION.

SHELL minute, elongated, very slender, thin, of a drab-white color, ornamented with elevated, compressed, sharp, rather distant, longitudinal ribs, of which there are from twenty to thirty on each whorl. The spire is obtuse at the apex, and composed of about eight flattish whorls, the last of which is about one-fourth the length of the shell, and somewhat angular below the middle ; suture deeply impressed. Aperture small, elongated, rhomboidal-ovate ; the lip is sharp, and somewhat pressed inward, so as to be parallel to the axis ; the columella is straight, and joins the lip at an angle, so as almost to form a notch at the base of the aperture.

Length of axis three-tenths of an inch ; diameter one-fifteenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits East Florida

in considerable numbers. In Cuba it is abundant, and was probably transported thence to Florida.

REMARKS. This is an anomalous form, with scarcely truncation enough at base to entitle it to a place in the genus *Achatina*. Moreover, the fine, longitudinal barring, like *Clausilia*, is a character quite foreign to that genus. It agrees somewhat better with *Bulimus* and *Pupa*, with one of which we should be disposed to place it. Without some definite place to arrange it elsewhere however, we deem it inexpedient to remove it from the genus where it was placed by the describer. It is closely allied to *Achatina Gossei*, but is not half its size.—[G.]

2. ACHATINA PELLUCIDA.

PLATE LIII. FIGURE 2.

Testâ sinistrorsâ, ovatâ, elongatâ, hyalinâ, politâ, dilutè corneâ ; spirâ obtusâ, anfractibus ad septem convexiusculis ; suturâ lineari ; aperturâ angustâ, labro acuto ; columellâ brevi, lamellâ intus decurrente supernè instructâ.

SYNONYMS AND REFERENCES.

Achatina pellucida, PFEIFFER, in Wieg. Archiv, 1840, I. 252.

Tornatellina Cubensis, PFEIFFER, Symbolæ, II. 130.

Monog. Helic. Viv. II. 391.

DESCRIPTION.

SHELL. Sinistral, ovate-lanceolate, acuminate, pellucid, highly polished and glistening. Whorls seven, very oblique, scarcely convex, the last one somewhat ventri-

cose towards the base, about two-thirds the length of the shell. Aperture narrow ovate, acutely prolonged posteriorly; lip simple; turning up the columella it becomes thickened, and winds into the aperture in the form of a tooth-like lamella.

Length one-tenth of an inch; breadth one-thirtieth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Florida, among small shells drifted in the sand. It is also found in Cuba.

REMARKS. There is yet much uncertainty about this beautiful little shell. Prof. Adams, who found this or a similar species in Jamaica, thinks it is most likely a marine shell, which is by no means improbable, and compares it to a minute *Melampus* drawn out in the direction of its axis. Dr. Pfeiffer removes it from the genus in which he first placed it, and places it in his genus *Tornatellina*. Amid this uncertainty, we allow it to remain under the name it bears in the tables of the first volume.—[G.]

GENUS GLANDINA, SCHUMACHER.

GENERIC CHARACTERS.

ANIMAL. Body elongated, narrowed anteriorly; tentacles four, long, the posterior ones having the eye spots on the posterior face, behind the tips, which are de-

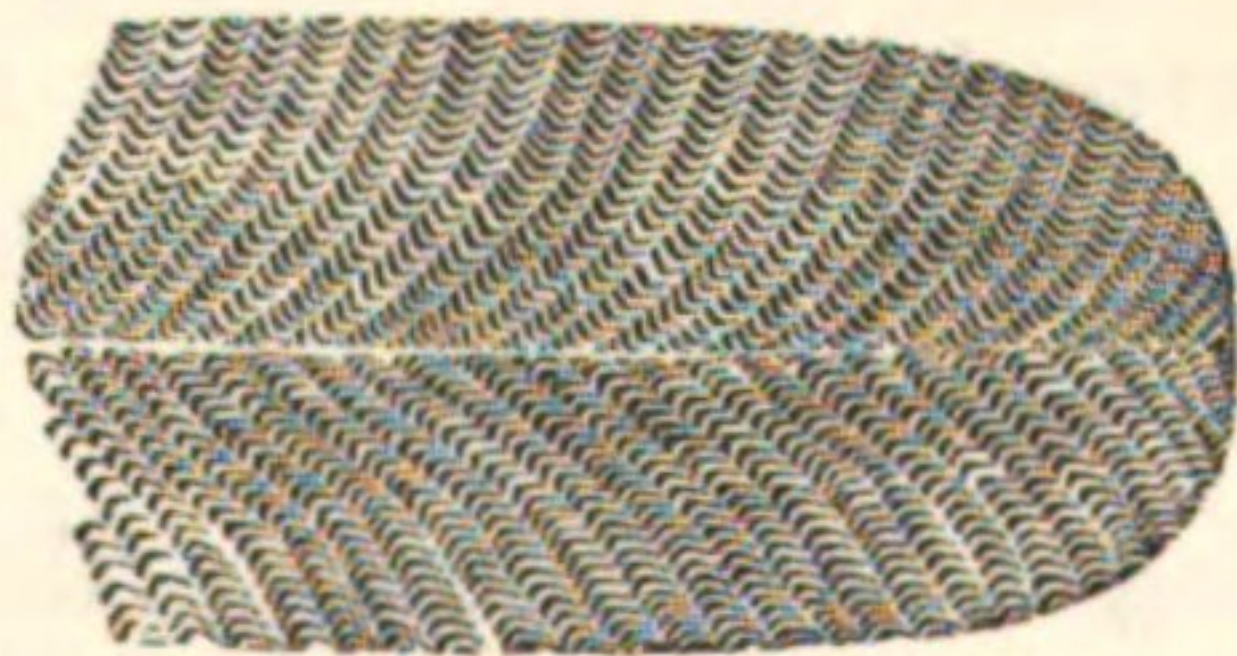
flected ; inferior tentacles half the length of the superior, bulbous, and somewhat deflected at tip ; on each side of the oral aperture is a retractile, palpiform appendage, attenuated at tip, and more or less recurved, nearly as long as the superior tentacles, the bases separated by a fissure in front ; buccal pouch capable of a probosciform protrusion, the aperture furnished with three papillæ above and three on each side ; lingual organ semioval, armed with oblique ranges of recurved hooks. Genital orifice at some distance behind the right tentacle.

SHELL lanceolate, ovate, or sub-cylindrical, corneous, glistening ; spire generally produced, the last whorl not less than half the length of the shell, and generally much longer. Aperture much longer than wide, narrow and acute posteriorly, rounded anteriorly ; columella arcuate, truncate at base, so as to form a canal ; lip simple, acute.

GEOGRAPHICAL DISTRIBUTION. This appears to be strictly an American genus, occupying the regions bordering on the mediterranean which separates the two continents, and the intervening islands. If there is any exception, it is in the case of *Achatina algira* of Southern Europe, which, judging from the shell alone, may belong to this genus. On this continent it is found as far north as Georgia, all along the Gulf of Mexico, and throughout Texas and Mexico.

REMARKS. As long ago as 1810, De Montfort indi-

cated this genus under the name of Polyphemus, founding it on the *Bulla voluta* of Chemnitz, the *Achatina glans* of Bruguière. Schumacher, in 1817, adopted this as a distinct genus ; but, as the name Polyphemus had been previously appropriated, he designated it by the name of Glandina. Férussac also recognized the peculiarities of the shell, and made for it a section of his genus *Helix*, under the name of *Cochlicopa*. The structure of the animal fully authorizes its separation as a distinct genus ; and yet, although Mr. Say carefully described the animal as long ago as 1818, most authors have still united it with *Achatina*, among whom may be mentioned Deshayes and Philippi, the most important recent writers on the subject. The animal is eminently carnivorous, and its favorite resorts are wet and swampy places ; when found in dry places, they are very small. Their eggs are of considerable size, oblong-spheroidal, and covered with a firm, calcareous shell.—[G.]



1. GLANDINA BULLATA, GOULD.

PLATE LXII. a.

G. testâ papyraceâ, bullatâ, diaphanâ, ellipsoideâ, lacteâ, ferrugineo tinctâ, longitudinaliter confertim striatâ; spirâ octantem longitudinis testæ æquante, anfractibus quinque convexiusculis; suturâ lineari; aperturâ latè lunatâ; columellâ leniter arcuatâ, laminâ callosâ indutâ.

SYNONYMS AND REFERENCES.

Glandina truncata, GOULD, Proc. Bost. Soc. Nat. Hist. III. 64, Oct. 1848.

DESCRIPTION.

ANIMAL not observed.

SHELL elongate ovate, ventricose, widest a little behind the middle, very light and thin, and so translucent as to show the whole of the pillar by transmitted light, very pale horn-color, tinged with rusty brown towards the aperture, shining, and marked longitudinally with fine, rounded striæ. Whorls five, tumid, the last composing about seven-eighths of the shell; suture delicate, not strongly impressed. Aperture two-thirds the length of the shell, narrow lunate, somewhat dilated by the moderate arching of the pillar margin, the lower third of which takes the direction of the axis; pillar margin covered by a delicate lamina of white callus.

Length of axis one and a half inches; breadth four-fifths of an inch.

GEOGRAPHICAL DISTRIBUTION. Obtained by the Rev. E. R. Beadle in Louisiana, in the region of New Orleans.

REMARKS. This species differs from *G. truncata* in its extreme tenuity and transparency, which is not in consequence of immaturity, as is shown by the callus on the pillar lip; it is much more inflated, the spire proportionally shorter, slightly modified by the suture, and with two whorls less; the pillar is much less arched than in *G. truncata*, where it actually curves to the right and forms an extensive sinus on the pillar margin: the striation, also, is twice as fine, and the coloration is much paler. Quite a large number of specimens, obtained at different times, have been examined, all of which agree in their characters.—[G.]

2. GLANDINA VANUXEMENSIS, LEA.

PLATE LXII. FIGURE 1.

G. testâ ovato-fusiformi, tenui, lucidâ, fulvâ albidomaculatâ, striis longitudinalibus et transversis ab apice ad medium decussatâ; spirâ conicâ, anfractibus septem convexis; suturâ crenulatâ; aperturâ ovato-lanceolatâ; columellâ arcuatâ.

SYNONYMS AND REFERENCES.

- Glandina vanuxemensis*, LEA, Trans. Am. Philos. Soc. V. 84, pl. 19, f. 78.
 PFEIFFER, Symbolæ, III. 91;
 Monog. Helic. Viv. II. 294.
Achatina vanuxemensis, REEVE, Conch. Icon. pl. 13, f. 48.

DESCRIPTION.

ANIMAL not observed.

SHELL elongated, ovate-fusiform, thin and fragile, considerably transparent, pale fawn color, in some specimens inclined to greenish, and generally flecked with distant, pale spots; the surface is, in a measure, coarsely granulated by the decussation of longitudinal and revolving lines, the latter of which are more distant from each other than the former, and become less and less distinct towards the anterior portion of the whorl. Whorls seven or eight, the apical ones smooth and forming a mammillary tip; suture crenulated. Aperture about one-half the length of the shell, nearly three times as long as broad; columella strongly arched, and scarcely glazed by enamel.

Length of axis two and three-fourths inches; breadth one inch.

GEOGRAPHICAL DISTRIBUTION. Hitherto obtained only in Texas and Mexico.

REMARKS. The essential distinctions between this species and the preceding, are its fragile structure, its reticulated surface, and its peculiar coloration. It also grows to a larger size. *Achatina Sowerbyana* of Pfeiffer seems to be the same. It differs only in wanting the white flecks. These, however, vary in amount so much as to afford good reason to suppose that they are sometimes wanting. Its form and partially granulated surface should rather be taken as its characteristics.—[G.]

3. GLANDINA TRUNCATA, SAY.

PLATES LIX. LX. LXI. FIGURE 2.

G. testâ oblongo-ovatâ, licet lanceolato-ovatâ, solidiusculâ, nitidâ, corneâ vel sæpissimè cinerascete rosaceo tinctâ, longitrorsum plicato-striatâ ; anfractibus ad septem convexiusculis, ultimo cylindraceo anticè angustato ; suturâ subcrenulatâ ; aperturâ lunatâ, angustâ.

SYNONYMS AND REFERENCES.

Bulla truncata, GMELIN, p. 3434.

Buccinum striatum, CHEM., IX. 36, tab. 120, f. 1028, 29?

Bulimus striatus, BRUG., Encycl. Meth. I. 366.

Cochlicopa rosea, FERUS., Prodrom. 356 ;

Hist. des Moll. pl. 135, f. 3, pl. 136, f. 6-10.

Achatina rosea, DESH., Encycl. Meth. II. 10 ; ed. Lamarck, VIII. 313.

Achatina truncata, D'ORB., Moll. Cub. I. 163, pl. 10, f. 13.

REEVE, Conch. Icon. pl. 13, f. 47.

Polyphemus glans, SAY, Journ. Acad. Nat. Sc. I. 282.

Glandina truncata, SAY, Amer. Conch. pl. 20 ;

CHENU. ed. (Bib. Conch.) III. 28, pl. 7, f. 2, 2a.

BECK, Index, p. 78.

PFEIFFER, Monog. Helic. Viv. II. 286.

DESCRIPTION.

ANIMAL twice the length of the shell, pale chestnut color, with pale bluish reflections ; surface finely reticulated ; a delicate channel runs along the median line of the neck, terminating between the superior tentacles, on each side of which are oblique folds.

SHELL strong, ovate-fusiform or ellipsoidal, obtuse at tip, of a pale, ashy fawn color, or rather, alternately striped with ash color and fawn color, and more or less tinted rose color, the surface shining and delicately fluted with longitudinal, raised, and rounded striæ. Whorls six

or seven, moderately convex, the last constituting three-fourths the length of the shell, somewhat compressed at the middle, so as to become in a measure cylindrical, narrowing forward and rounded at base; suture strongly marked, delicately crenulate. Aperture about one-half the length of the shell, often more, and twice as long as broad, narrow, ovate-lunate, acute posteriorly, obtusely rounded anteriorly; lip nearly rectilinear at its middle portion, and springing somewhat forwards; columella arched at its lower portion, and decidedly truncate at tip; throat salmon-colored, edge of lip pale.

Average length one and a half inches; breadth somewhat more than one-third the length.

GEOGRAPHICAL DISTRIBUTION. Inhabits Florida, and along the Atlantic coast as far as Charleston, S. C. It has been found in Mississippi and Texas, and is common among the West India Islands.

REMARKS. This is a very variable species. We have given as synonyms, such references and names as we felt no doubt related to the shell in question, satisfied at the same time that many more might justly be added had we the means of deciding, by comparison, respecting shells which are designated in books and cabinets under different names. *Bulla voluta* of Chemnitz (*Achatina glans* of Lamarck) seems to have no characters decidedly separating it from this; and the same may be said of the *Buccinum striatum* of Müller. If so, either of these names would precede the one we have applied. But, from the impossibility of comparing the specimens truly

representing them with ours, we are compelled to stop at the point where the evidence ceases to be clear.

The habits of this animal are somewhat aquatic. It is found on the sea-islands of Georgia, and around the Everglades of Florida ; and in these situations the shell often attains the length of two and a half inches, — when found on the oyster hummocks and less humid localities, it seldom exceeds one inch in length. In young individuals the spire forms but a small proportion of the shell ; but in the old it often forms one-third of the length.

The animal is in part, if not altogether, carnivorous ; and its powerful tongue, armed with long, sharp-pointed hooks, is well adapted to its food. By its action, the soft parts of its prey are rapidly rasped away, or are forced in large morsels down the œsophagus. The animal has been seen to swallow entire the half putrid remains of a *Helix*, and to attack *Limaces* confined in the same box with it, rasping off large portions of the integument, and in some instances destroying them. In one instance an individual attacked and devoured one of its own species, thrusting its long neck into the interior of the shell, and removing all the viscera.—[G.]



GENUS CYLINDRELLA, PFEIFFER.

GENERIC CHARACTERS.

ANIMAL small and short compared with the shell, in general like that of *Helix*; tentacles four, the superior of medium length, the inferior quite short. Motions sluggish; the shell drags horizontally, nearly in the line of motion.

SHELL elongated, cylindrical, or fusiform, composed of numerous whorls, the last of which is usually disjoined from the preceding, and partially uncoiled; aperture with a continuous, revolute lip, circular or polygonal; its plane nearly parallel with that of the axis of the shell.

GEOGRAPHICAL DISTRIBUTION. As far as we know, this genus is confined to the islands and shores of the Gulf of Mexico. There are abundant species in Cuba and Jamaica, and, doubtless, on other islands. A few have been found in Texas and Mexico, and three species, as we regard them, are found in East Florida, one of which, and probably all, is found on the island of Cuba. A single species has been named as coming from the Philippine Islands; but we apprehend there may have been some mistake in this, either as to the locality or as to the genus; possibly, it might have been a *Truncatella*.

REMARKS. The group of shells here designated was

first set apart by the Rev. Lansdowne Guilding, in 1828, under the generic name, *Brachypus*, derived from the very short pedal disk when compared with the length of the shell; but as this name had been previously applied to other animals, he afterwards substituted for it the name *Siphonostoma*. The same year Dr. Pfeiffer applied to it the name *Cylindrella*. These names are both highly descriptive of the shell; but, as Guilding's second name had also been previously in use, and Dr. Pfeiffer's name has generally obtained, we also adopt it. The characters of this group appear to be sufficiently prominent and natural, both in respect to the shell, the animal, and its circumscribed range. The shell has been hitherto ranked with *Pupa*, *Cyclostoma*, and *Clausilia*. It resembles the latter in its form, but lacks the clausilium, and has, rather, the aperture of *Cyclostoma*; there is, however, no operculum. The animal differs from that of *Cyclostoma* in the number of tentacles and position of the eyespots; it is, however, closely allied to the animals of *Clausilia* and *Pupa*.

The apical nucleus of the shell is a small globule; this is succeeded by a large number of closely revolving whorls of still smaller diameter, which scarcely augment in length; and then there is a rapid dilatation to the full size of the shell. At this part, either by fracture, or more probably by absorption, the slender tip is thrown off, so that we have only the truncated lower portion left. In many species the last whorl stretches out into a long neck; in others, however, this uncoiling is very slight,

and the lip is in contact with the preceding whorl, and approaches the true Pupa. The shells of this genus are all extremely graceful, and many are very delicate. Numerous species have been recently described.—[G.]

1. CYLINDRELLA PONTIFICA, GOULD.

PLATE LXIX. FIGURE 1.

C. testâ parvâ, ovatâ, fusiformi, attenuata, albidâ rufo griseoque marmoratâ ; spirâ acuminatâ ; suturis impressis, crenulatis ; anfractibus duodecim, convexis confertissimè et obliquè striatis ; ultimo anfractu carinato ; aperturâ orbiculari, laterali, campanulatâ, edentatâ ; labro acuto, margine sub-reflexo ; axe vix perforato.

SYNONYMS AND REFERENCES.

Pupa pontifica, GOULD, Proc. Bost. Soc., III. 40. June, 1848.

DESCRIPTION.

ANIMAL whitish, translucent, a little darker above the head ; body very short, terminating in a blunt extremity. Superior tentacles of moderate length, of nearly equal diameter throughout, terminating in a rounded bulb ; lower tentacles very short, nearly rudimentary. Ocular points large and black.

SHELL fusiform, attenuated-cylindrical, whitish, or grayish clouded and marbled with brown ; spire acuminate ; whorls from nine to twelve, rounded, with numerous oblique, prominent striæ, or ribs ; suture impressed, crenulated by the extension of the alternate

ribs across it ; aperture rounded, oblique ; lip thin, somewhat reflected ; axis impressed, not truly perforate. On the last whorl, a colored line revolves : this is sometimes raised a little from the surface, and sometimes is sharp like a delicate carina.

Extreme length half an inch ; extreme diameter one-fifth of an inch ; ordinary size less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the southern part of East Florida and the adjacent islands, also the island of Cuba.

REMARKS. Its numerous, tumid whorls, agreeably marbled, and its crenulated suture and graceful form, render this a very pretty species. It differs entirely from any other North American shell ; but belongs to a group peculiar to the West Indies, of which there are now several species known.

When in motion, the axis of the shell is parallel with the line of progress, and lies almost horizontally. The rapidity with which the animal moves is quite surprising. The advance seems to be effected in this way. The posterior point of the disk of the foot, being detached from the object on which it rests, is carried forward by muscular contraction and again fixed, leaving a curve between the attached point and the next anterior part of the disk, which is not yet detached. This operation is continued throughout the whole disk, every part of which becomes successively detached, curved upward, and again attached, from the extremity to the snout, exhibit-

ing in action a curved or wavy motion, or undulation, commencing at the extremity, proceeding rapidly forward, and terminating at the head. But before one muscular wave is exhausted at the head, another has begun to flow; so that two series of undulations are visible at one time. With this double alternation of action, the body is propelled with a rapidity greater than can be attained by the more common, gliding motion of the Helices. During motion the tentacles are extended, and remain steadily in one position.

They are found in woods, on the ground, under leaves, but are not very plentiful. The most northern point where they have hitherto been noticed is Tampa. On the eastern shore of the peninsula, they occur at Cape Florida, and also at Key West and Key Biscayne.

[The great similarity of this shell to *P. unicarinata* of Lamarck and *Cylindrella Gossei*, Pfeiffer, would at first throw some doubt on the propriety of regarding it as a distinct species. Compared with the former, it is smaller, has more whorls, a more complete aperture projecting to the left side, and is still more remarkable for the crenulated suture produced by the projection of every second rib. It is larger than *C. Gossei*, and very differently colored. Dr. Binney, with much doubt, called it *P. unicarinata*; and it is regarded as a Pupa in the tables of the Introduction; but, on further consideration, it is clearly to be placed in the genus *Cylindrella*, having all its peculiarities.—[G.]

2. CYLINDRELLA LACTARIA, GOULD.

PLATE LXIX. FIGURE 2.

C. testâ fusiformi, ad apicem truncatâ, tenui, albidâ, sursum fuscescente, rivulis lacteis undique longitudinaliter notatâ; anfractibus (superstitibus) ad decem, convexiusculis, concinnè striatis, ultimo carinato; aperturâ circulari, amplâ, expansâ; peristomate albo, modicè everso; collo brevi.

SYNONYMS AND REFERENCES.

Pupa (Siphonostoma) *lactaria*, GOULD, Bost. Journ. Nat. Hist. IV. 491, pl. 24, fig. 13.

DESCRIPTION.

ANIMAL white, with a dark line along the back of each tentacle, one along the median line, and a very delicate one along each cheek; ocular points large and black.

SHELL fusiform, truncated at tip, thin and translucent, yellowish white, becoming dusky towards the apex, and ornamented with longitudinal, flexuous, milk-white lines. Permanent whorls about ten, the entire number about twenty-five, elegantly sculptured with delicate, oblique, longitudinal striæ, of a uniform size on all the whorls; the last whorl has a distinct keel skirting the region of the umbilicus; protrusion from the preceding whorl short, forming a large, rounded, trumpet-shaped aperture, expanding into a narrow, white lip. Aperture at an angle of forty-five degrees with the axis of the shell.

Length three-fifths of an inch; breadth three-twentieths of an inch.

REMARKS. In shape this species resembles *C. elegans*, Pfeiffer, though more nearly like the shell figured by Férussac as *Clausilia subula*, in size and sculpture; but it is more ventricose, has fewer whorls, a shorter neck, a larger aperture, and a less broadly reflected lip. The animal is very small compared with the shell, being less than one-fourth the length of the shell, which it carries with its axis nearly horizontal, and in the line of motion, with apparent difficulty. The snout is thrown forward, and firmly attached at every undulation, simultaneously with the contraction of the posterior extremity. When the curve flowing along the sides of the foot reaches the head, the attachment of the snout is released, and it is again thrown forward and fixed as before.

3. CYLINDRELLA JEJUNA, GOULD.

PLATE LXIX. FIGURE 3.

C. testâ fusiformi, solidiusculâ, truncatâ, pallidè corneâ, filis tenuibus albis longitudinaliter lirâtâ; anfractibus superstitibus ad novem, convexis, ultimo exiliter carinato; suturâ benè impressâ; collo brevissimo; aperturâ expansâ, peritremate albo, continuo, anfractui penultimo haud annexo.

SYNONYMS AND REFERENCES.

Cylindrella jejuna, GOULD, Proc. Bost. Soc. Nat. Hist. III. 41, June, 1848.

DESCRIPTION.

ANIMAL not observed.

SHELL rather small, fusiform, truncated at apex, quite solid, of a pale horn-color, longitudinally striped with

delicate, white lines. Spire composed of about nine whorls, though when entire the whole number would be about twice as many; they are convex, and separated by a well-marked suture; the last whorl has a delicate carina, and extends in a short neck. The aperture is bell-shaped, the lip white, continuous, and not in contact with the preceding whorl.

Length two-fifths of an inch; breadth about one-tenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found abundantly in Florida.

REMARKS. This may be a diminutive variety of *C. lactaria*, a species presenting numerous variations in the length of the neck and the development of the lip. But it seems to be constantly smaller, darker colored, more solid, and with more convex whorls. The peritreme, also, seems never to rest on the penultimate whorl, as is the case in *C. lactaria*.—[G.]

GENUS PUPA, DRAPARNAUD.

GENERIC CHARACTERS.

ANIMAL small, about twice as long as broad, wide and square in front, slightly tapering and obtusely rounded posteriorly; beneath, the head is separated from the foot by a transverse line; the cephalic portion is transverse, more or less lobed in front; the locomotive disc is long oval, truncate in front. Tentacles four, the cervical ones oculiferous at tip, the oral ones short and sometimes reduced to a minute tubercle. The viscera are remarkable for their great length.

SHELL elongated, cylindrical or acuminate, with numerous whorls, the last of which differs but little from the preceding one, having its plane nearly corresponding to the axis of the shell. Aperture sub-circular, or semi-oval, simple or armed with denticles or laminae; lip simple or reflected; base perforated by a fissure or circular umbilicus.

GEOGRAPHICAL DISTRIBUTION. Specimens of this genus have been found over the greater part of the globe. Few are known from Africa or Eastern Asia; and I am not aware that any one has been found in New Holland. They are numerous in Europe, Western Asia, North America, and the West Indies. Perhaps they may be found equally abundant elsewhere, when

other regions have been equally well explored. On account of their minute size, they are not easily detected; but they have been found abundantly, in all parts of the United States where they have been properly sought for.

REMARKS. This genus was first instituted by Draparnaud to include the minute species of Europe, of which *P. dolium* is an exemplar. Previously, these shells had been included in the genera *Helix*, *Turbo*, and *Trochus*, from which they were very properly separated. Draparnaud intended it to include all the elongated, cylindrical species, in which the whorls were very numerous, the successive whorls differing but little from each other, and the last one being but little larger, and often even smaller, than the penultimate. The aperture in these cases was also peculiar, being nearly circular, the lips continuous, or nearly so, and the throat often armed with denticles or folds. He, however, separated from these, under the name *Clausilia*, those which he found to possess a calcareous lid to the aperture, opening inwards by a spring. Lamarck adopted these genera, but expressed his doubts as to the propriety of separating *Clausilia* from *Pupa*. Deshayes and others unite them without hesitation; but we still think that the shells which possess the *clausilium* are entitled to rank as a distinct genus, and that they have peculiarities, in other respects, sufficiently marked to support this claim.

We regard the genus as altogether an artificial one;

and nothing can be more decisive that it is not founded in natural characters than the fact, that although it is adopted by all authors, yet it is so modified and dismembered by each one of them, that no two of them include the same species under it. Many groups have been detached by different authors, some of which will doubtless prove true genera when the difficult task of examining animals so small shall have been accomplished. Among our own shells which have been arranged under this genus, we have already stated that *P. exigua* is a Carychium, and belongs to a different family, and probably *P. corticaria* also. All the other small species may be divided into two groups; those which have the oral tentacles distinct, (Pupa,) and those in which they are not decidedly apparent, (Vertigo.) This distinction would seem to be only one of degree, were it not that there are peculiarities in the shells of the two groups also; those of the former group being paler colored, ovate, and more solid, while those of the latter are darker, thin, and more cylindrical; the aperture of the latter is armed with denticles, which are peculiarly long and slender. The animals are also more aquatic in their habits; and the want of inferior tentacles would seem to bring them somewhat in alliance with the fresh-water Pulmonata. We are not disposed to insist on the subdivision, however, in the present limited knowledge we have of the structure of the animals belonging to the shells. The large West India species, with which our Florida species, *P. incana*, is to be associated, consti-

tutes another well-marked group, if not a distinct genus, — they are so superior in size, and so different in their habits, choosing the vicinity of salt water, and even places dashed by salt spray, rather than forests or localities kept moist by fresh water.

Most of the species are so small that it requires much care and no little skill to find them. Some are found in forests, under decaying leaves, or fragments of dead branches, lying on the ground, or in the crevices of bark, or about decaying stumps and logs; some are found in plats of moss, others under stones, sticks, etc. in the open fields; and many at the margins of brooks, pools, and ponds, under chips, or crawling up the stems of plants, and seem to be incapable of existing unless abundantly supplied with moisture, seeming to be aquatic rather than terrestrial in their habits. They feed on decaying vegetable matter, keeping themselves in the shade, and adhering closely to the objects on which they rest when in repose. In the winter they bury themselves under the leaves or in the earth. These little shells possess great beauty, and well repay a careful study. When largely magnified they show a great variety and complication of parts, all wrought to the highest perfection of form and polish, and forcibly illustrate the skill of the great Creator.—[G.]

a. Tentacles distinctly four. (PUPA.)

1. PUPA MARITIMA, PFEIFFER.

PLATE LXVIII.

P. testâ albâ, cylindraceâ, obtusâ, densè et leviter striatâ ; anfractibus numerosis, planis ; aperturâ sub-ovali, dentatâ ; labro incrassato, sub-reflexo ; basi compresso, sub-carinato ; striis confertis, ad axim confluentibus ; axi impresso, imperforato.

SYNONYMS AND REFERENCES.

Pupa maritima, PFEIFFER, Wieg. Archiv, 1839, I. 353 ;

Monog. Helic. Viv. II. 322.

KÜSTER, ed. Chemn. tab. 9, figs. 10 - 13 ;

LISTER, Icon. l. c. t. 588, f. 49.

DESCRIPTION.

ANIMAL whitish, brownish, smoky, or nearly black, darker on the back and upper part of head. Body finely granulated, the granules arranged in regular lines longitudinally, making the surface look as if minutely and longitudinally furrowed. Tentacles rather short, slender, bulbous at the extremities.

SHELL white, moderately thick, cylindrical, obtuse at both extremities ; whorls from eight to twelve, of unequal width, separated by well-defined, though not deep sutures, flat, with numerous sub-oblique striæ, sometimes amounting to fine ribs ; aperture sub-ovate, white, with a minute, deep-seated tooth on the columellar margin, and another at the base, indicating the position of the im-

pression at the base of the axis; lip white, thickened, sub-reflected; base of shell compressed, sub-carinate; axis imperforate, impressed, with all the striæ more strongly developed and thickly converging towards it.

Greatest length of axis one and a quarter inches; ordinary length one inch. Diameter of shell two-fifths of an inch.

GEOGRAPHICAL DISTRIBUTION. Found hitherto in the northern part of Cuba, and in the southern part of the peninsula of Florida.

REMARKS. This species is found plentifully at Key West, where it inhabits low grounds near salt water ponds. It attaches itself to saline plants, a few inches from the soil. At other times it retreats under stones. It is, probably, confined to the vicinity of the ocean. It has also been found on other neighboring *keys*, and on the main land near Cape Florida. The animal varies much in color; it is shy when kept in confinement. In winter it forms a membranous epiphragm.

The general appearance of this shell is cylindrical, with both extremities obtuse. The width of the central whorls is nearly uniform; the upper only become gradually narrower to the apex. The number of whorls is usually about nine, but sometimes twelve; and the progressive increase of the width of the whorl, in revolving from the apex to the aperture, though regular in each specimen, differs so much in different specimens, that some shells are very short and robust, while others are long

and fusiform. The whorls are nearly flat, the surface shining, and marked with numerous angular striæ, which, on the back of the last whorl, attain sometimes the prominence of wrinkles. The lip is often very thick ; it is not added until the shell has acquired at least seven or eight full volutions. The outline of the external aperture is an oval, whose greatest diameter is parallel with the axis of the shell, truncated obliquely by the columellar margin ; internally, it is modified by a lamellar tooth or fold on its superior parietes, and another marking the depression of the axis ; when these are prominent the outline of the throat of the aperture is somewhat trilobate. One or both of the teeth are sometimes wanting. The apex of the spire is corneous. Its color is chalky or hoary white, with frequently a livid brown tint beneath.

This species is nearly allied to *Pupa uva* and *P. mumia* of M. Lamarck, and, together with those and perhaps some other species, constitutes a sub-generic group peculiar to the West India Islands and the main land in their vicinity. This group has not been sufficiently studied, and needs elucidation. In the opinion of some, it consists of a single species with numerous, strongly marked, local varieties.

[This shell was described by Dr. Binney as a new species, and is referred to in the first volume under the name, *P. incana* ; and the plate representing it is so lettered ; but it is so evidently the *P. maritima* of Dr. Pfeiffer that it would be deviating from scientific rules to

introduce it under any other name. It is most likely that *P. cyclostoma*, Küster, is merely a small specimen of this species, its variation in size being very considerable.—G.]

2. PUPA MODICA, GOULD.

PLATE LII. FIGURE 2.

P. testâ minutâ, fragili, ovato-conicâ, elongatâ, albidâ vel corneâ, edentatâ, imperforatâ; anfractibus quinque convexis, apice acuminatâ; aperturâ campanulatâ, labro expanso, haud planulato.

SYNONYMS AND REFERENCES.

Pupa modica, GOULD, Proc. Bost. Soc. Nat. Hist. III. 40, June, 1848.

DESCRIPTION.

SHELL small, delicate, elongated, ovate-conic, whitish or pale horn-colored, imperforate. Whorls five, convex, the apex of the spire acute. Aperture expanded, lip revolute, but not flattened; throat destitute of teeth.

Length of axis one-tenth of an inch; breadth one-fifteenth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Florida by Mr. Bartlett.

REMARKS. The form and other characters of this shell are almost precisely those of *Bulimus fallax*, except that it is only about half as large, and has about two whorls less to the spire. The aperture is somewhat more bell-shaped; and the lip is thin and revolute instead

of being thick and flattened. Being so closely allied, these shells should not be separated from each other ; but as they seem to come more properly under this genus than under *Bulimus*, it is placed accordingly.—[G.]

3. PUPA ARMIFERA, SAY.

PLATE LXX. FIGURE 4.

P. testâ albidâ, cylindraceâ, obtusâ ; anfractibus sex, vel septem, convexis ; aperturâ sub-ovali, dentibus quatuor armatâ, quorum unus lamellatus anfractui ultimo, alter columellæ, et alteri duo labro, affixi.

SYNONYMS AND REFERENCES.

Pupa armifera, SAY, Journ. Acad. Nat. Sc. II. 162.

KIRTLAND, Ohio Report, 173.

GOULD, Boston Journ. III. 400, pl. 3, f. 10.

ADAMS, Vermont Mollusca, 7 ; Sill. Journ. XL. 271.

PFEIFFER, Symb. II. 53 ; Monog. Helic. Viv. II. 357.

DE KAY, New York Fauna, 52.

Pupa armigera, POT. et MICH., Galerie, I. 159, pl. 16, f. 1, 2.

DESCRIPTION.

ANIMAL black, superior tentacles long and slender, lower tentacles conical and prominent. Respiratory orifice very visible at the angle formed by the junction of the lip with the body whorl.

SHELL cylindrical, sub-fusiform, smooth ; whorls six to seven, convex, the three next the aperture of about equal diameter, the posterior three diminishing and forming a rather obtuse apex ; suture impressed ; lip white ; thin, sub-reflected, forming the whole outline of the aper-

ture except a small portion of the body whorl, where a thin, testaceous deposit connects its two extremities; aperture lateral, nearly oval, deep, cup-shaped, and narrowing towards the throat, which is almost filled up by projecting teeth; white within; teeth commonly four, one of which, affixed to the body whorl, commences at the superior margin of the aperture, near the junction of the lip and ultimate whorl, and runs backward and downward into the aperture; it is prominent, lamelliform, irregular, has one or more sharp, projecting points, and is sometimes bifid; another, thick and massive, is situated deep in the throat, and marks internally the place of the umbilicus; and two others, projecting and toothlike, are placed on the lip, and point towards the centre of the aperture.

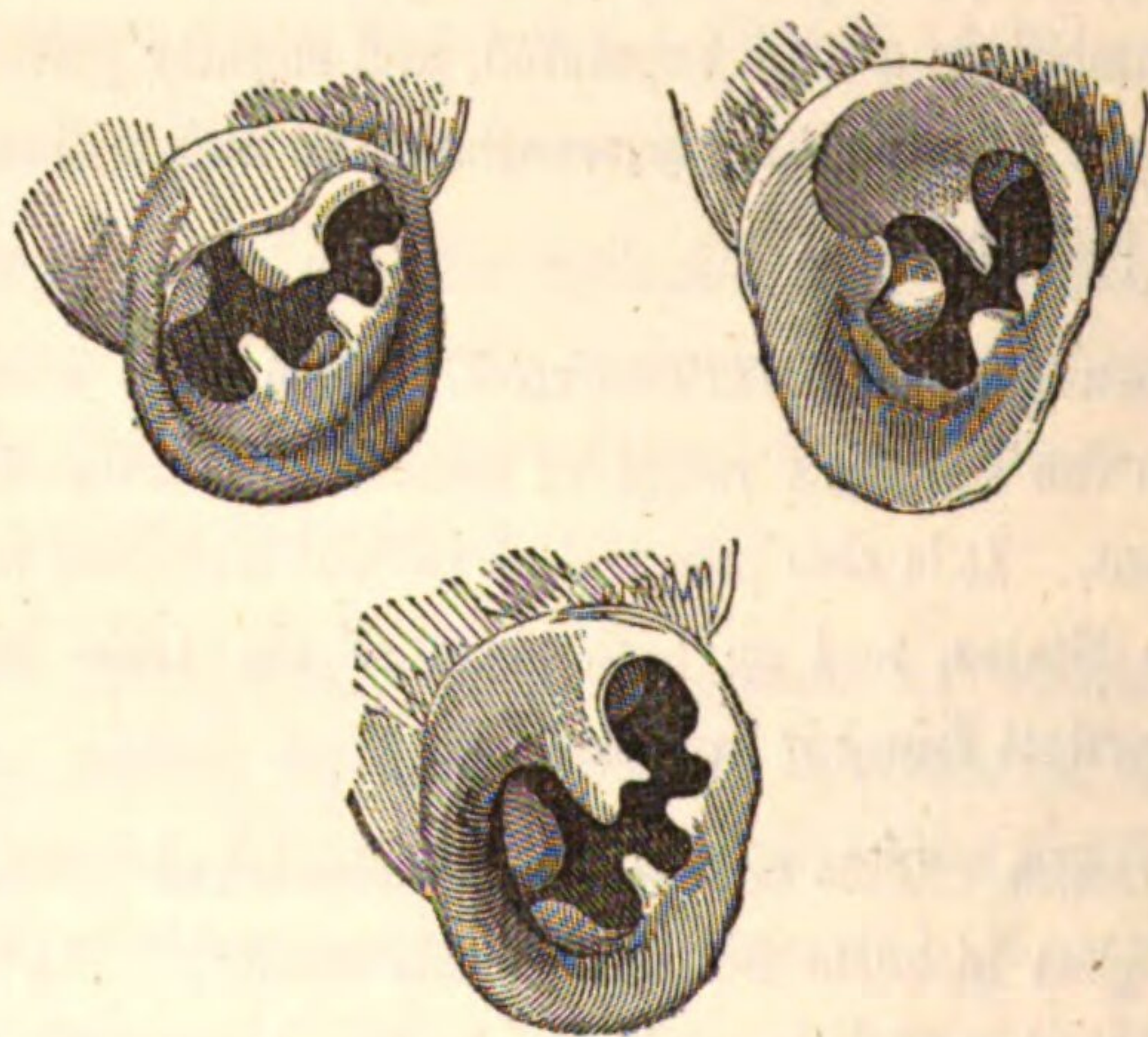
Base of the shell, from the umbilicus to the edge of the aperture, compressed, forming a short and obtuse keel; umbilicus a little expanded, and slightly perforate.

Length of axis three-sixteenths of an inch; diameter half of the length.

GEOGRAPHICAL DISTRIBUTION. This is a common shell in the northern range of States from Missouri to Vermont. It is also plentiful at various localities in the Middle States, and on both sides of the Ohio River. Mr. Bartlett found it in Arkansas.

REMARKS. This common and well-marked species is the largest hitherto noticed in this country. At whatever extremes of distance it may be found, specimens pos-

sess a remarkable similarity of size, color, and general aspect ; and the white, lamelliform tooth of the aperture serves at once to distinguish them from every other species. The normal number of teeth, or that number which is most commonly observed in adult individuals is certainly *four* ; but, in addition to those described, there is sometimes a small tubercle, or diminutive tooth, very near the junction of the lip and body whorl, and more rarely another of the same description, at the base of the aperture, near the umbilical tooth. If those only are to be considered fully mature which possess all the teeth, then the species may be characterized as having six teeth in the aperture ; but as one of them is nearly always, and another generally, wanting, the description here given is correct. The margin of the lip is sometimes continuous entirely around the aperture.



4. PUPA BADIA, ADAMS.

PLATE LXX. FIGURE 3.

P. testâ cylindraceâ, rufâ, apice obtusâ; anfractibus sex vel septem; aperturâ parvâ, rotundatâ, dente unico columellæ adnato; labro sub-reflexo; umbilico perforato.

SYNONYMS AND REFERENCES.

Pupa badia, ADAMS, Boston Journ. III. 331, p. 13, f. 18; Vermont Mollusca, 7.
GOULD, Boston Journal, III. 404.

DESCRIPTION.

ANIMAL not observed.

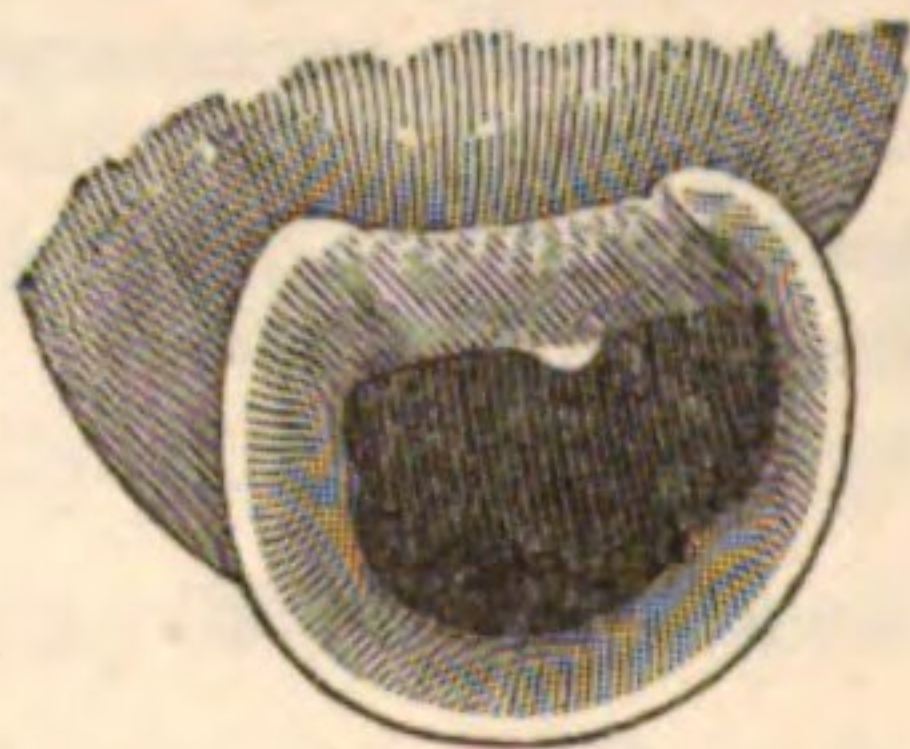
SHELL cylindrical, sub-fusiform, obtuse at both extremities; epidermis dark chestnut-color, or bay; whorls six to seven, rounded, the anterior four of about equal diameter; suture deep; aperture lateral, nearly circular, small, its diameter equal to two-thirds of the diameter of the last whorl, a thin, testaceous deposit forming a thickened margin internally, with an obtuse tubercle upon the columella; transverse margin sub-reflected; lip perforate.

Length one-eighth, transverse diameter, one-sixteenth, of an inch.

GEOGRAPHICAL DISTRIBUTION. Noticed only on the western shores of Lake Champlain, about the ruins of the fort at Crown Point.

REMARKS. This is a very pretty species, and is

quite distinct from any other found in this country. It is thought by some to resemble, and even to be identical with *P. muscarum* of Europe ; but Draparnaud's figure of that species is quite unlike ours in outline and in the shape of the aperture, while his *P. doliolum* is, in shape and general aspect, much more nearly akin to it.



5. PUPA CONTRACTA, SAY.

PLATE LXX. FIGURE 2.

P. testâ albido-corneâ, ventricosâ, sub-conicâ ; anfractibus quinque, convexis ; aperturâ sub-triangulari, expansâ, dentibus quatuor armatâ, quorum unus crassus in columellam, alter parvus in labrum, et alteri duo faucibus profundè positi ; labro albo, reflexo ; umbilico perforato.

SYNONYMS AND REFERENCES.

- Pupa contracta*, SAY, Journ. Acad. II. 374.
 GOULD, Boston Journ. III. 399, pl. 3, f. 22;
 Invertebrata, 186, f. 117.
 DE KAY, Nat. Hist. N. Y. 49. pl. 4, f. 47.
 ADAMS, Vermont Mollusca, 8.
 PFEIFFER, Symbolæ, II. 54 ; Monog. Helic. Viv. II. 356.
 KÜSTER, in Chemnitz, 2d ed. 96, tab. 13, f. 16-18.

DESCRIPTION.

ANIMAL blackish above, foot light gray. Superior

tentacles long and slender, slightly curving; inferior prominent and conical, pellucid at tips. Respiratory foramen visible in the external angle of aperture.

SHELL sub-conical; epidermis whitish horn-color; whorls between five and six, very convex, diminishing regularly from the last whorl, which is somewhat ventricose, to the apex; suture well impressed; lip white, thickened, somewhat reflected, its extremities connected by a raised, testaceous fold, making the margin of the aperture entire; aperture lateral, rather triangular or trilobate, more than half as wide as the body whorl, expanded above and diminishing regularly into a very narrow throat, with four teeth, one upon the columella, large, coarse, and irregular, projecting into and very much filling up the aperture, and having a concavity on the side towards the lip; another tuberculous, not large, more or less near the margin of the lip; and two others, massive and prominent, deep seated in the throat, one being in the base behind the columellar tooth, and the other on the side of the umbilicus and apparently produced by the umbilical fold; umbilicus with a minute perforation; base of the shell with a sharp keel between the umbilicus and margin; last whorl impressed behind the outer lip.

Length one-tenth, diameter one-twentieth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Northern, Middle, and Western States, also Florida, Louisiana,

Arkansas, and Texas. It is the most universally distributed of all our species.

REMARKS. This is a well-defined species, and may always be known by its sub-conical shape and triangular aperture, nearly filled up by the coarse, projecting, columellar tooth. The description here given applies to the most common form of the mature shell, as ascertained from the examination of more than one hundred specimens from different localities. Among a number of specimens, there will of course be different degrees of development and consequent variation from the normal form. Specimens from particular localities seem always to be more delicate, and never to attain that coarseness of parts in the aperture which is common. There is sometimes a slight thickening of the left lip, near its extremity. Mature specimens vary considerably in size. The aperture is beautifully white within.



6. PUPA DECORA, GOULD.

PLATE LXXI. FIGURE. 3.

P. testâ minutâ, cylindraceâ, nitidâ, lucidâ, vinosâ, tenuissimè striatâ, perforatâ ; spirâ anfractibus quinque vel sex, ventricosis, apice rotundatâ ; suturâ profundâ ; aperturâ semi-ovali, dentibus quatuor cruciatim dispositis armatâ ; peristomate vix reflexo.

SYNONYMS AND REFERENCES.

Pupa decora, GOULD, Proc. Bost. Soc. Nat. Hist. II. 263, Dec. 1847; with a woodcut.

DESCRIPTION.

ANIMAL not observed.

SHELL minute, cylindrical, rounded at apex, thin, shining, translucent, of a wine-yellow color, regularly striated by lines of growth. Spire of five or six closely revolving, rounded whorls, deeply separated at the sutures. Aperture nearly round or semi-oval, obliquely limited by the penultimate whorl, armed with four slender denticles, the largest of them on the transverse lip, one on the columellar lip, and two on the outer lip, all disposed so as to form the arms of a cross. The lip is slightly reflexed, and indented opposite the base of the two labial denticles ; at the columella, it rises against a distinct umbilical perforation.

Length one-tenth of an inch, breadth one-twentieth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the region of Lake Superior, where it was first obtained by Mr. T. R. Dutton, and subsequently by Mr. J. W. Foster.

REMARKS. This is one of our prettiest species. It is rather larger and darker colored than *P. corticaria*; and its aperture is much smaller, and differently armed. Its form, color, and armature are more like *P. Gouldii*; but its size is twice as great. It no doubt belongs to the same section of the genus.—[G.]

7. PUPA PENTODON, SAY.

PLATE LXII. FIGURE 1.

P. testâ ovatâ, albidâ, umbilicatâ; anfractibus quinque, convexis; apice sub-acutâ; aperturâ obliquè semicirculari, dentibus quinque ad octo munitâ, quorum uno vel duobus posticè, duobus ad columellam, duobus, usque ad quinque, ad labrum positis; labro expanso.

SYNONYMS AND REFERENCES.

Vertigo pentodon, SAY, Journ. Acad. Nat. Sc. II. 376.

Pupa pentodon, GOULD, Boston Journ. Nat. Hist. IV. 353, pl. 16, f. 10, 11;
Monog. of genus Pupa, p. 11, pl. 16, f. 10, 11.

DE KAY, Nat. Hist. N. York, (Moll.) 50, pl. 4, f. 48, pl. 35,
f. 337.

PFEIFFER, Monog. Helic. Viv. II. 359.

Pupa curvidens, GOULD, Invertebrata, 189, fig. 120.

Pupa Tappaniana, ADAMS, Sillim. Journ. XL. Suppl. Thompson's Vermont.
PFEIFFER, Symbolæ, II. 55.

DESCRIPTION.

ANIMAL blackish above, light gray below; foot mode-

rately long, the transverse fissure very distinct, the anterior portion having the mouth in the centre, and bilobate in front. Tentacles four, the oral ones about one-third as long as the cervical. Very sluggish in its movements, and carries the shell nearly horizontally, or very slightly elevated.

SHELL of an elongated ovate form, minutely striated, and of a spermaceti, or whitish horn-color. Whorls about five, well rounded, and separated by a deep suture; apex rather acute. Aperture oblique, nearly semicircular; the lip is sharp, and somewhat expanded, but not reflexed; the sub-margin of the throat is thickened by a ridge of white callus, on which the denticles are situated; one of these, and sometimes two, is on the transverse lip, two on the columellar portion, and two constantly, and from one to five others occasionally, on the outer lip; of these, that near the middle of the transverse lip is largest, that at the upper part of the pillar is next, and one opposite the first, on the outer lip, is the third in size.

Length somewhat less than one-twelfth of an inch.

GEOGRAPHICAL DISTRIBUTION. It has been found in Massachusetts, Vermont, New York, Pennsylvania, Ohio, where it is very common, Maryland, South Carolina, and Georgia; so that, with the exception of *P. contracta*, it is more widely distributed than any other species. It lives near the foot of trees and under leaves, in shady woods, occasionally in moist and exposed localities.

REMARKS. This is a very variable species. The ordinary specimens vary chiefly in the armature of the aperture, the marginal, internal rim of calcareous matter thickening with age, and developing more numerous denticles. The Ohio specimens are of more than ordinary size, clean and shining, and were the form designated by Prof. Adams as *P. Tappaniana*. Those found in Massachusetts are considerably smaller, covered with a well developed epidermis, and often, if not always, have the aperture decidedly modified in form, being more triangular, and the denticles more or less curved. To these was applied the name *curvidens*; and the modifications are so constant as to incline us still to regard them as constituting a distinct species. With all its variations, it has an aspect which enables us readily to separate it from all other species. The form of the shell itself, and its semicircular aperture, are sufficiently peculiar. A more careful examination of the animal shows decidedly that it does not belong to *Vertigo*, as supposed by Mr. Say.—[G.]



S. PUPA VARIOLOSA, GOULD.

PLATE LXXII. FIGURE 2.

P. testâ minimâ, ovato-conicâ, rufâ, sub-perforatâ, confertim indentatâ ; anfractibus quatuor ad quinque, turgidis ; suturâ profundâ ; aperturâ obliquè semi-ovali, dente columellari, altero labiali, altero postico lamellari, armatâ ; labro vix reflexo.

SYNONYMS AND REFERENCES.

Pupa variolosa, GOULD, Proc. Bost. Soc. Nat. Hist. III. 40, June, 1848.

DESCRIPTION.

SHELL minute, ovate-conical, with a pointed apex, of a yellowish-green color, apparently smooth, but when examined by a considerable magnifying power, is found to be thickly pitted with dots of unequal size and irregularly disposed. There are four or five narrow, tumid whorls, separated by a profound suture. The aperture is obliquely semi-oval, and has a posterior lamellar tooth winding within the shell, a tooth on the columella, and another a little to the right of the basal apex. A small umbilical opening is covered by the reflected columellar lip, and the outer lip is slightly everted.

Length of the axis one-twelfth of an inch.

GEOGRAPHICAL DISTRIBUTION. Collected by Mr. Bartlett in East Florida.

REMARKS. This species is our smallest with the ex-

ception of *P. milium*, and is most readily distinguished by its short, conical form. The five specimens examined all presented the crowded, thimble-like impressions, under a magnifying power of twenty diameters. I think it is the only American species which has a tooth revolving within the shell, on the penultimate whorl.—[G.]

b. Tentacles apparently two only. VERTIGO.

9. VERTIGO GOULDII, BINNEY.

PLATE LXII. FIGURE 2.

V. testâ minutâ, ovato-cylindraceâ, sub-castaneâ; anfractibus plusquam quatuor; apice obtuso; aperturâ sub-cordatâ, bilobatâ, dentibus quinque armatâ; labro sub-reflexo.

SYNONYMS AND REFERENCES.

- Pupa Gouldii*, BINNEY, Proc. Bost. Soc., 1843. I. 105.
GOULD, Boston Journ. IV. 352, pl. 16, f. 9.
PFEIFFER, Monog. Helic. Viv. II. 358.

DESCRIPTION.

ANIMAL with two tentacles only; black above, foot gray, tapering posteriorly, and rounded at the extremity; carries the shell at an angle of about forty-five degrees.

SHELL light chestnut, cylindrical ovate; whorls rather more than four, ventricose, the last occupying nearly one-half the length of the axis; aperture lateral, composed of two unequal curves meeting in the centre of the outer lip, with five prominent, white teeth; namely, one upon the transverse margin, two upon the umbilical margin,

and two upon the labial margin; lip thickened, not reflected; umbilicus a little open.

Length of axis one-sixteenth, diameter one-thirty-second, of an inch.

GEOGRAPHICAL DISTRIBUTION. A widely spread species. Noticed hitherto near Baltimore, Albany, and Boston, on the bark of oak trees, in groves. Also by Mr. Haldeman in Eastern Pennsylvania, on damp ground near springs. Mr. Stimpson has found it most abundant in heaps of stones, in open fields.

REMARKS. A very pretty species, intermediate between *P. ovata* and *P. milium*, both of which it resembles in the character of the aperture; but it differs from the former in the less developed character of the last whorl, and from the latter in size. When placed in a moist place the animal moves with great activity; but in a dry place it speedily withdraws into the shell, and attaches itself firmly by the aperture. In winter, it is always found thus attached to sticks and stones by a thin, calcareous epiphragm, which often remains upon the resting-place when the shell is torn away.



10. VERTIGO OVATA, SAY.

PLATE LXXI. FIGURE 4.

V. testâ minutâ, ventricosâ, sub-conicâ, succineâ ; anfractibus quinque, convexis ; aperturâ semi-circulari, bilobatâ, dentibus sex instructâ ; labro albo, bicurvato, expanso ; umbilico perforato.

SYNONYMS AND REFERENCES.

Vertigo ovata, SAY, Journ. Acad. Nat. Sc. II. 375.

Pupa ovata, SAGER, Michigan Catalogue, 14.

GOULD, Monog. of Pupa, 8 ; Bost. Journ. Nat. Hist. IV. 350.

DE KAY, New York Rep. 31 ; Nat. Hist. N. Y. 50, pl. 4, f. 50.

ADAMS, Vermont Mollusca, 7 ; Silliman's Journal, XL. 271.

SAY, Exped. St. Peter's, II. 259, pl. 15, f. 5.

Pupa modesta, GOULD, Invertebrata, 188, f. 119.

DESCRIPTION.

ANIMAL. Head and back deep cherry-red, posterior part of foot bluish, base whitish. Tentacles larger towards the extremities, or remarkably club-shaped ; ocular points distinct. The anterior extremity of the foot is dilated and trilobate, the middle lobe minute, lateral lobes rounded. Length rather greater than that of the axis of the shell.

SHELL minute, ovate-conic, ventricose, dark amber-colored ; whorls five, very convex, the last much inflated, diminishing rather rapidly to a somewhat acute apex, with an indentation towards the aperture ; suture rather deep ; lip thin, somewhat expanded, with a groove behind and a thickening within ; aperture in general out-

line semi-circular, the curve consisting of segments of two different sized, but well defined circles, the smaller on the right at the junction of the lip and body whorl, comprising about one-fourth of the whole contour, and forming an angle at their junction. Teeth six, two on the transverse margin, two on the columellar margin, the upper of which is massive, the lower pointed, and two on the outer lip, in the base and at the junction of the two curves, sharp and prominent; umbilicus expanded.

Length three-fortieths of an inch; transverse diameter one-twenty-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Northern, Middle, and Western States. Is common in Massachusetts.

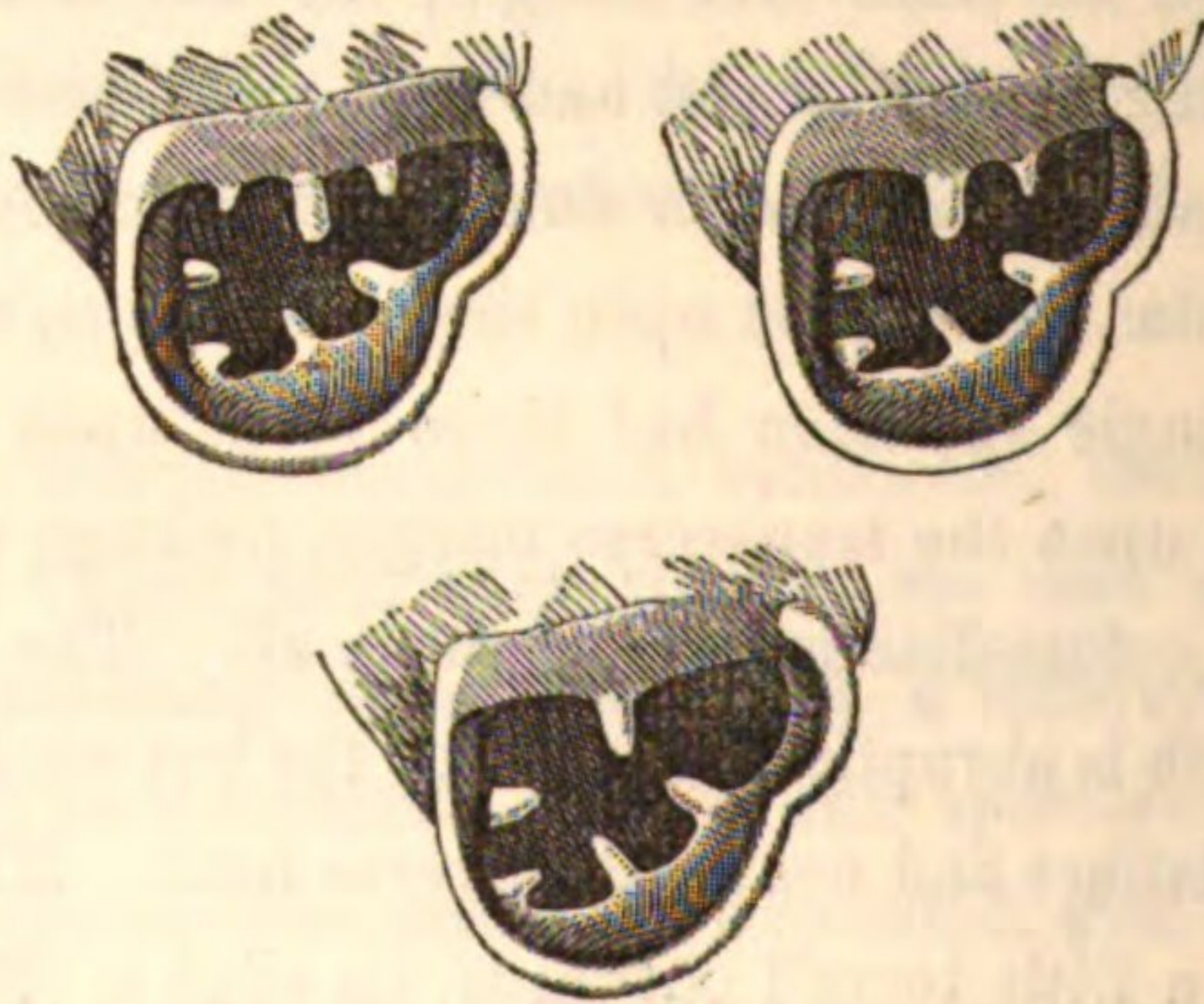
REMARKS. Of forty specimens of this shell examined by me, with the aid of a microscope, one had a single tooth, two had three teeth, and twenty-eight had two teeth, upon the transverse margin, the one nearest the centre being always largest and most prominent; and all of them had the bilobate, or double curved aperture, and the irregular indentation upon the outer whorl, near the lip. A single specimen had three teeth upon the lip, and three upon the transverse margin, making, with two upon the columellar margin, eight in all. The semi-circular mouth is abruptly truncated by the last whorl, which forms a distinct and nearly transverse limit. The lip is thin and a little turned outwards, its edge is often whit-

ish, but within it is brownish, and often thickened. The indentation of the last whorl, terminating at the angle of the lip, is a prominent character. The teeth of the lip are often curved towards the centre of the aperture.

The motion of the animal, when in progress, is rapid, but awkward. The proboscis, which is long and projectile, seems to be thrust forward, and attached, and the rest of the foot drawn up to it, reminding one of the motion of a caterpillar, the shell at the same time rolling from side to side. The adherent forces of the animal evidently lie in the anterior part of the foot.

This is one of the more aquatic species, and is found under dead leaves and sticks, and on the stems of plants, at the margin of rivulets and ponds.

An opportunity for examining the original specimen of Mr. Say's *P. modesta* having been afforded, it proves to be this shell, with the aperture somewhat modified by its having been fractured.



11. VERTIGO MILIUM, GOULD.

PLATE LXXI. FIGURE 1.

V. testâ minutissimâ, ovali, castaneâ ; anfractibus quinque, convexis ; aperturâ semi-circulari, sub-cordatâ, dentibus sex armatâ ; labro bicurvato ; umbilico expanso.

SYNONYMS AND REFERENCES.

Pupa milium, GOULD, Bost. Journ. III. 402, pl. 3, f. 23 ;

Invertebrata, 187, f. 118.

DE KAY, Nat. Hist. New York, 48, pl. 4, f. 44.

ADAMS, Vermont Mollusca, 7 ; Sill. Journ. XL. 271.

PFEIFFER, Monog. Helic. Viv. II. 362.

DESCRIPTION.

ANIMAL very light gray, darkest above ; foot thick, broadest behind the middle, tapering suddenly to a point. Tentacles two, somewhat globular at tips, in the centre of which are the eye spots.

SHELL very minute, sub-cylindrical, diminishing equally to both extremities ; epidermis dark amber, or chestnut color ; whorls five, rounded, very minutely striated, decreasing slightly to the apex, which is obtuse ; suture deep ; lip white, slightly reflected ; aperture lateral, half the width of the last whorl, within brownish, general shape semi-circular, truncated abruptly and directly by the last whorl, a testaceous deposit upon which forms the transverse margin, and connects the two extremities of the lip ; circumference made up of two curves of different radius uniting in the outer lip, where the junction causes an angle projecting inwards, the smaller curve compris-

ing about one-fourth part, and forming the superior portion, of the outer lip. Teeth six, two on the transverse margin, sharp, projecting, and toothlike ; one in the angle between the columellar and transverse margins, broad, massive, and prominent, with occasionally one or more tubercles about its base ; one on the lower part of the columellar margin ; two on the outer lip, in the base of the aperture, and at the junction of the two curves. Umbilicus rather wide.

Length one-thirtieth, diameter one-fortieth, of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Massachusetts, Connecticut, and Vermont, Ohio and Mississippi, and, probably, is widely extended.

REMARKS. This is the most minute of our shells, and probably of the genus ; and although so small that the eye cannot, without the aid of a microscope, detect its characters, they are very strongly defined. The parts about the aperture are particularly well developed, the teeth being long, compressed, and sharp, and the transverse margin distinctly bounded. Prof. Adams mentions that twelve mature specimens weighed less than six-tenths of a grain. It is found under or among dead leaves. It is gregarious in its habits ; when one is found, many others may be quite certainly found near it.



12. PUPA CORTICARIA, SAY.

PLATE LXXII. FIGURE 4.

P. testâ albido-corneâ, sub-cylindraceâ, obtusâ ; anfractibus quinque ; aperturâ sub-orbiculari ; columellâ dente unico, propè angulum externum, armatâ ; et ad angulum internum sub-dentatâ ; labro reflexo ; umbilico perforato.

SYNONYMS AND REFERENCES.

Odostomia corticaria, SAY, Nich. Encyc. IV. pl. 4, f. 5.

Pupa corticaria, GOULD, Boston Journ. III. 397, pl. 3, f. 19.

DE KAY, New York Report, 31.

KÜSTER, in Chemn. 2d ed. tab. 13, figs. 19 - 20.

PFEIFFER, Monog. Helic. Viv. II. 358.

DESCRIPTION.

ANIMAL. Superior tentacles long and club-shaped, the inferior short and thick. Color whitish, darker upon the head and tentacles.

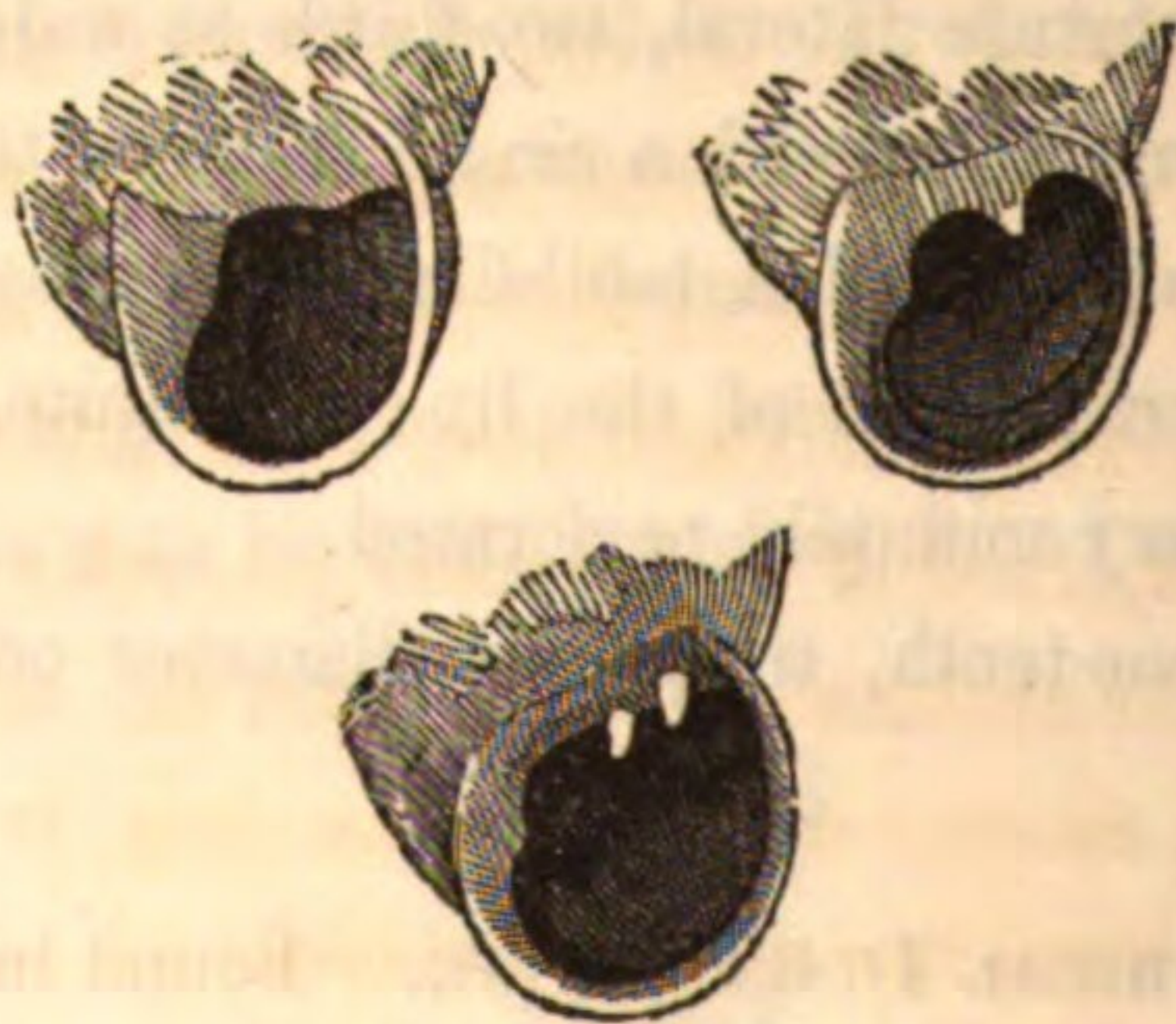
SHELL whitish, shining, cylindrical, obtuse at the apex ; whorls rather more than five, convex ; suture well impressed ; aperture lateral, two-thirds as wide as the last whorl, sub-orbicular, with a single tooth on the pillar lip, near the centre, and a toothlike enlargement near the umbilical termination of the lip ; lip white, reflected ; umbilicus very minutely perforated.

Length one-tenth, transverse diameter one-twentieth, of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in the Middle Atlantic States, and those north of the Ohio. I also

have specimens from Mississippi. It is probably a widely spread species, although less common than some others.

REMARKS. This is a very thin and delicate shell, and has a peculiar transparency, resembling spermaceti. The aperture is somewhat circular, the upper part being interrupted by the last whorl, and the extremities of the lip not being connected. The smaller tooth is often wanting, and sometimes both. In the number and position of the teeth, it somewhat resembles *P. exigua*; but it is less fusiform, and more cylindrical. In general outline, and in the shape of the aperture, it very much resembles *P. rupicola*, but the parts within the aperture are very different. It is, however, just what the immature shell of that species might be supposed to be, when the dentiform deposits were only commenced, and the lip thin and unfinished. I am much inclined to believe that it is only a young shell. In the great number of specimens which I possess, the teeth are only rudimentary.



13. PUPA RUPICOLA, SAY.

PLATE LXX. FIGURE 1.

P. testâ cylindraceâ, elongatâ, apice obtusâ ; anfractibus sex convexis, oblique striatis ; aperturâ semi-ovali, dentibus quinque armatâ ; umbilico perforato.

SYNONYMS AND REFERENCES.

Pupa rupicola, SAY, Journ. Acad. II. 163.

GOULD, Boston Journ. IV. 355, pl. 16, f. 13.

PFEIFFER, Monog. Helic. Viv. II. 358.

Pupa procera, GOULD, Boston Journ. III. 401, pl. 3, f. 12.

DESCRIPTION.

SHELL cylindrical, elongated ; epidermis brownish horn-color ; whorls six, convex, the three anterior ones of nearly equal diameter, the three posterior diminishing very slightly, and forming an obtuse apex ; suture deep ; lip brownish, thickened within, widely reflected ; aperture lateral, semi-circular, truncated above by the body whorl ; teeth five, one on the middle of the columella prominent, compressed, emarginate in the middle, and often bicuspid ; another at the termination of the axis, marking internally the situation of the umbilicus, conical, and often composed of two or more tubercles ; a third in the base of the aperture, a fourth upon the outer lip, and a fifth, often massive and prominent, deep in the fauces behind the columellar tooth ; umbilicus minute.

Length one-tenth, diameter one-twentieth, of an inch.

GEOGRAPHICAL DISTRIBUTION. Mr. Say found it abundant on the banks of St. John's River, East Florida, and under the ruins of Fort Picolata. It occurs also near Baltimore and Charleston, S. C., and was brought from the Island of St. Croix, by Dr. Griffith. Mr. Bartlett found it at Key West and in Arkansas.

REMARKS. Mr. Say noticed the resemblance between this species and *P. corticaria*; future observations will, I believe, prove them to be identical. That the two quoted above as synonymous are so, is fully shown by the comparison of numerous specimens. The length of the spiral cylinder varies considerably. The characters of the aperture are constant; but the teeth, except those on the transverse margin and at the extremity of the axis, are frequently wanting; its outline is well rounded, and the lip broadly expanded. There is often an abrupt curve of the outer lip between the tooth of that side and its junction with the body whorl. The upper boundary of the aperture is distinctly marked by the body whorl, which makes a horizontal truncature of the superior part of the oval. The teeth, except the two constant ones, are deeply seated in the throat, and cannot always be seen without considerable attention.



14. PUPA SIMPLEX, GOULD.

PLATE LXXII. FIGURE 3.

P. testâ minimâ, cylindraceâ, lævi, ad apicem obtusâ, rufo-corneâ; anfractibus sex, convexiusculis; aperturâ orbiculari, edentulâ; labro reflexiusculo.

SYNONYMS AND REFERENCES.

Pupa simplex, GOULD, Boston, Journ. Nat. Hist. III. 403, pl. 3, f. 21;

Invertebrata of Mass., 190, fig. 121;

Monog. of Pupa, 7, pl. 3, f. 21.

PFEIFFER, Monog. Helic. Viv. II. 302.

DE KAY, Nat. Hist. New York, 52, pl. 36, f. 347.

DESCRIPTION.

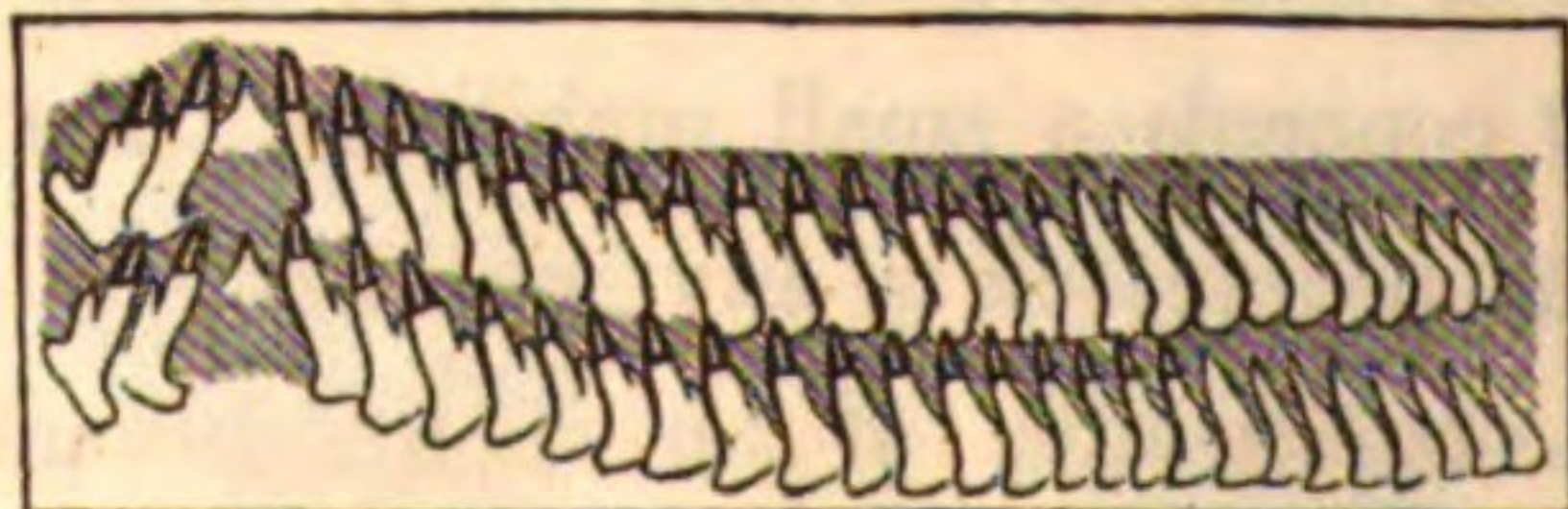
ANIMAL dark gray above, light gray and pellucid below; foot moderately long, trilobate anteriorly, the middle lobe minute. Tentacles two only, usually clavate, sometimes very decidedly. Shell carried perpendicularly, or even inclined forwards. Active in movement.

SHELL minute, cylindrical, obtuse at apex, smooth chestnut color. Whorls five, well rounded, separated by a deep suture; aperture circular, the lip nearly continuous, simple or scarcely everted, except on the left, where it partially conceals a small umbilicus. No trace of a tooth has been detected in any specimen.

Length one-fifteenth of an inch; breadth half as great.

GEOGRAPHICAL DISTRIBUTION. Found in Massachusetts, near Cambridge, in considerable numbers; a few have been received from Stamford, Connecticut.

REMARKS. The simplicity of this shell, so much like immature specimens of some other species, has thrown some question upon the validity of this species. (See Proceed. Bost. Soc. Nat. Hist. I. 105, 106.) Since numerous specimens have been found, and the animal also has been examined, there seems no longer room for doubt. Supposing it to be a young shell, in which the aperture were still imperfect, it would best correspond to *P. Gouldii*. But that species has fewer whorls, when mature, than this exhibits; besides, the animal is quite different in form, corresponding in that respect with *P. ovata*, with which it is more truly allied; the color of the animal is different, the apices of the shells are altogether different, and the habits and localities of the animals as diverse as possible. Moreover, it is found most abundantly in May and June, a time when none but adult shells of any species occur. It is found in the woods, under moist leaves. It is the analogue of *P. edentula* of Europe.—[G.]



GENUS CYCLOSTOMA, LAMARCK.

GENERIC CHARACTERS.

ANIMAL terrestrial, elongated, unisexual; mouth at the termination of a somewhat extensile proboscis; tentacles, two, subulate; eyes at the external base of the tentacles; respiratory sac largely open in front and above.

SHELL discoidal, ovate conic, or pupoid, whorls cylindrical; aperture circular, or slightly angular posteriorly; lip reflexed, its inner margin, and generally the outer margin also, continuous; operculum horny or bony, the nucleus central, umbilicated, the spirals more or less numerous.

GEOGRAPHICAL DISTRIBUTION. This genus belongs to the tropics, or to the temperate regions bordering thereupon. In America, it ranges from Florida to Brazil. It is found on all the borders of the Mediterranean, is wanting on the western coast of America, Western Africa, and New Holland, is abundant in India and the islands of the Indian Ocean, and on the equatorial groups of the Pacific islands.

REMARKS. The genus Cyclostoma was instituted by Lamarck; and he at first included in it various land,

fresh water, and marine shells with circular apertures, but afterwards restricted it to the terrestrial species with an operculum. Its limits are not yet well determined, and its natural affinities are by no means settled. Its respiratory system and its mode of life would bring it in connection with the Helicidæ; but its single pair of tentacles with eyes at the base, its operculum, and especially its reproductive system, would rather associate it with the Turbinidæ. Some are inclined to include in one genus, all the operculated, terrestrial shells, with the exception of *Helicina* and *Pupina*, and also the new genus *Steganotoma*; while others would subdivide them into several genera. We are disposed to rank with the latter, and to regard the group as a natural family, and to make of it several genera. We think that the great variety of form, texture, and sculpture, authorizes such a subdivision, and the more especially as certain combinations of these characters are limited, or nearly so, to certain geographical areas. M. Troschel has based a subdivision upon the structure of the operculum; and his division has been still further extended by Dr. Pfeiffer. Now, although the organization of this appendage, of itself, may not be sufficient to justify a new generic distribution, yet it must be evident that its form, texture, and the conformation of its spiral, must depend on a modification of the animal; and it is not a little remarkable that the forms of the operculum are found to vary in each of the local and structural groups above mentioned. As general examples, we may say that the

species from the coast and islands of Eastern Africa, are generally solid, heliciform shells, with the aperture decidedly angular posteriorly, and with a bony operculum of only two or three spirals. The South American species are planorboid, with a broad umbilicus, a perfectly circular aperture, and a horny, multispiral operculum. In the West Indies is an extensive group of a pupoid form, cancellate surface, truncated tip, circular aperture and calcareous, multispiral operculum, with the edges of the spiral projecting so that it appears laminated. In the Pacific, we have one or two groups quite different from any thing found elsewhere. Without pursuing the subject further, however, we will merely say, that we believe that when a thorough comparison of the species shall be made, a remarkable limitation of species of a certain structure of the shell to a certain geographical area will be found, and also a corresponding difference in the structure of the animal; consequently a subdivision of the genus *Cyclostoma*, as it is now received, will follow.—[G.]



CYCLOSTOMA DENTATUM, SAY.

PLATE LXII.

C. testâ conico-cylindraceâ, detruncatâ, sub-perforatâ, concinnè cancellatâ, ex flavo rufescente, sæpè rufo interruptim fasciatâ; anfractibus quatuor, convexis; suturâ fimbriatâ; aperturâ orbiculatâ, posticè angulatâ; labro reflexiusculo, albo.

SYNONYMS AND REFERENCES.

Cyclostoma dentatum, SAY, Journ. Acad. Nat. Sc. V. 125, Aug. 1825.
DE KAY, New York Fauna, p. 82.

DESCRIPTION.

ANIMAL. Body very short, pale, tentacles darker, slender, somewhat enlarged at tips; eyes black, prominent, situated on a tubercle at the external base of the tentacles. Proboscis bifurcate, the two points serving the purpose of buccal tentacles. Operculum horny, the spiral of about two and a half turns.

The shell is carried somewhat laterally, and very little elevated. The motions of the animal are very rapid; the locomotive disk contracts in an undulatory manner; and when the animal has advanced so that the shell drags along by its side, by a sudden contraction of the neck the tip of the shell is suddenly jerked forward, so as to bring the shell at right angles with it; and this movement, in a quarter of a circle, is very rapidly performed. As the operculum prevents the animal, when

at rest and retired within its shell, from adhering by means of its foot, as is usual with the Helicidæ, the animal has the power of spinning a short thread, which is attached to the object of support; and by this it hangs suspended at pleasure.

SHELL conic cylindrical, or turreted, truncate at tip, the surface finely cancellate with raised, longitudinal, and revolving threads. Color varying from yellowish to brown, usually with darker brown bands, which are generally interrupted in such a manner that the colors also form longitudinal stripes. Whorls, when complete, seven; but the three uppermost are usually lost; they are rounded, and separated by a deep, crenulated suture. Aperture rounded ovate, a little angular posteriorly; lip a little reflexed, white. Base with a minute perforation.

Length half an inch; diameter one-sixth of an inch.

GEOGRAPHICAL DISTRIBUTION. It is abundant at Key West, both in woods and open places.

REMARKS. This is the only representative of the genus within the United States, and appears to be identical with a species from Cuba, from which island it was probably derived. Mr. Say's description, however, preceded that of all others. It is of the pupoid form, like that characteristic of the West India species generally, and would come under the true genus Cyclostoma, even as restricted by Dr. Pfeiffer. There is some latitude in the size of the shell, and also in its more or less conical

form. In coloring it is very variable. In general, it is of a yellowish or brownish color, rarely simple, but usually surrounded by four or five dark bands, all or most of which are broken up into dots, so as also to form longitudinal series; and sometimes these coalesce, so as to form longitudinal, zigzag stripes. The denticulation at the suture is caused by the prolongation of two adjacent bars, which return into each other; and in the interval between two denticles are about three other bars. There can be little doubt that this is identical with the West India shell since described under the names of *C. Aubereanum*, and *crenulatum*.

GENUS HELICINA, LAMARCK.

GENERIC CHARACTERS.

ANIMAL terrestrial, narrow, large for the shell; head extensile; tentacles two, slender, eyes on small tubercles at their external bases; respiratory cavity widely open in front and above; unisexual; operculum horny, nucleus nearly central, elements concentric, semi-lunate or sub-quadrate.

SHELL small, sub-globose, pyramidal, or lenticular, imperforate; whorls few, smooth or spirally ridged; colors green, yellow, or brown, sometimes banded with brown. Aperture oblique, semilunar, outer lip semicircular; colu-

mellar margin rectilinear, the two margins meeting at the base at an angle.

GEOGRAPHICAL DISTRIBUTION. In general, this genus is found in company with Cyclostoma. In the United States, however, it is found not only along the Gulf of Mexico, but in the Southwestern and Western States, as far as Ohio. It is abundant in the West Indies, in Brazil, and in the high islands of the Pacific. But I know of no species from the west coast of America, from Africa, Europe, New Holland, or indeed from any continental part of the Old World.

REMARKS. This genus was originally instituted by Lamarck. He regarded the presence of an operculum, and the peculiarities of the animal, as justifying their being set apart; but, on account of their general form and habits, he still associated them with the Helicidæ. Mr. Say, in examining and describing *H. orbiculata*, in 1818, noticed the same peculiarities, and placed it under a new genus, which he called Oligyra, and also noticed its alliance to Cyclostoma. His conception of the limits of the genus, was not very exact, as he afterwards described, under the same name, shells which undoubtedly belong with the Helicidæ. The details which the observation of numerous species has since afforded, render it quite certain that the genera Cyclostoma, and Helicina, and some others derived from them, and we may with almost equal confidence add Truncatella, form a natural group separate from the Helicidæ, more nearly allied to the

Trochidæ. Mr. Gray makes a family exclusively for them, which he calls Oligyradæ; but it would not seem that their anatomical characters are sufficiently diverse from those of Cyclostoma to justify a separation.—[G.]

1. *HELICINA ORBICULATA*, SAY.

PLATE LXXIII. LXXIV. FIGURE 3.

H. testâ parvâ, sub-globosâ, solidulâ, tenuissimè striatâ flavescente, cinerascete, vel rufescete, plerumque ad peripheriam albo-zonatâ; spirâ anfractibus quinque, convexis; aperturâ lunatâ; labro reflexiusculo, albo, incrassato, junctione cum columellam dentiformi.

SYNONYMS AND REFERENCES.

Oligyra orbiculata, SAY, Journ. Acad. Nat. Sc. I. 283, May, 1818;

Nicholson's Encycl. IV.;

American Conchology, pl. 46, figs. 4, 5, 6.

Helicina orbiculata, GRAY, Zoöl. Journal, I. 70.

Helicina rubella, GREEN, Doughty's Cab. Nat. Hist. II. 291, anno 1832.

DESCRIPTION.

ANIMAL. Head and tentacles black, the other parts of the body dark. Tentacles long and slender, tapering to a point. Eyes black and prominent. Motion gliding as in *Helix*. Operculum horny, turning back upon the columella as if upon a hinge.

SHELL. Shell sub-globose, acute at apex, solid, smooth, very delicately striated; color yellowish, brownish, or ash-colored, with a linear, pale zone at the periphery, which passes up the spire at the suture, and makes it white; there are also in many specimens

numerous capillary zones, and some specimens are mottled with pale spots. Whorls five, well rounded, suture well impressed. Aperture rather large, semilunar; lip white, moderately reflexed, and often greatly thickened and protruded by age; columella short, joining the lip at nearly a right angle, and forming thereby a denticular protuberance; base delicately enamelled.

Diameter three-eighths of an inch; axis one-fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found plentifully in Florida, and abundantly in Texas, also in Alabama, Mississippi, Georgia, Tennessee, and Ohio.

REMARKS. This species seems to be distributed over a very wide extent of territory, and also to be subject to great variations in size and coloring. From specimens collected in company, within a very small area, individuals might be selected differing so widely from each other that no one would hesitate to regard them as very different species, unless their history were known. That such a multiplication of species has already been made, there can be little doubt. In the first place, *H. rubella*, Green, corresponds to immature specimens of this shell. It is true that Dr. Binney regarded it as quite distinct, and identical with *H. occulta*, as is fully detailed in the first volume, page 183-4. But we are satisfied that had he been spared to have examined the numerous specimens in his collection he would have expressed a different opinion. *H. castanea*, (Thes. Conch. f. 31, 32,)

must be an immature, brown specimen, like that which has been called *H. rubella*. *H. minuta*, Sowb. (Thes. Conch. f. 40, 41,) seems also to be the same. *H. ambeliana*, De Roissy, agrees well with the large banded specimens from Texas. Dr. Pfeiffer regards it as the same as a shell from Texas which he has under the name of *H. tropica*, Jan. When young, the shell is girdled with lines of loosened epidermis, producing a coarse, velvety surface. These are soon worn off, and the surface becomes smooth; the lip becomes greatly thickened, and its inner face shoots out, so as to form a double lip. The true habitat seems to be Texas, where the shell is very abundant, and acquires a great size and thickness. The general globular form, smooth surface, and the lip with its peculiar basal angle, are its permanent characters.—[G.]

2. HELICINA CHRYSOCHEILA, BINNEY.

PLATE LXXIV. FIGURE 4.

H. testâ ovato-conicâ, tenui, nitidâ, luteâ, striis tenuissimis decussantibus insculptâ; anfractibus quinque, convexiusculis, ultimo magno, ad peripheriam angulato; basi complanato; aperturâ perobliquâ, semi-ellipticâ; labro tenui, reflexo, flavo, callo labiali aurantiaco.

DESCRIPTION.

SHELL broad conic, or pyramidal, thin, shining, pale yellow, with the surface finely shagreened with micro-

scopic, punctured lines. Spire elevated, whorls five, moderately convex, the last one somewhat flattened at base and indistinctly angular at the periphery. Aperture large, very oblique, semi-oval, the diameters about equal; the lip broadly everted, especially at its middle portion, narrow and simple at its columellar junction, of a golden-yellow color; labial callus extended, of a deep orange color.

Axis one-third of an inch; diameter two-fifths of an inch.

REMARKS. Of the history of this shell nothing is known except that it was named by Dr. Binney, and figured by him with the other species. Hence it is to be inferred that he had good authority for considering it a native of the United States. It is not figured by Sowerby in his Monograph of Helicina, unless it be under the name of *H. Jamaicensis*, which it very much resembles. The base seems to be more convex, and the lip notched at base. It is a very pretty species, and must be rare in collections.—[G.]



3. HELICINA OCCULTA, SAY.

PLATE LXXIV. FIGURE 2.

H. testâ parvâ, solidulâ, conico-orbiculari, cretaceâ, striatâ ; anfractibus quinque, convexiusculis, ultimo angulato ; suturâ lineari, marginatâ ; aperturâ parvâ, lunatâ ; labro incrassato, ad columellam haud angulato.

SYNONYMS AND REFERENCES.

Olygyra occulta, SAY, Journ. Acad. Nat. Sc. I. 182.

Helicina occulta, SAY, Transylv. Journal of Medicine, IV. 529 ;

Descr. of New Terr. and Fluv. Shells, (from the Disseminator,) p. 15 ;

American Conchology, pl. 46. figs. 1, 2, 3.

DESCRIPTION.

SHELL small, rather solid, low conical, acute at apex, cretaceous, obviously striated ; spire of five nearly plane whorls, the last of which is angular at the periphery, and this angle continuing up the spire adjacent to the suture, makes it appear double. The aperture is small, semi-lunar ; the lip is scarcely reflexed, but is thickened internally ; the columella is very short, and joins the lip by a slightly waving curve, without forming an angle.

Diameter one-fourth of an inch ; length of axis one-fifth of an inch.

GEOGRAPHICAL DISTRIBUTION. Found in Indiana, Ohio, Mississippi, and probably throughout the valleys of the Ohio and lower Mississippi.

REMARKS. This shell is found abundantly in a fossil state, in the post-tertiary formation of the West; and it is not certain that it now exists in a recent state. A different opinion was expressed in the first volume, (p. 183 - 4); but we have been induced by subsequent observations to adopt a contrary conclusion, as will be seen in the remarks upon the preceding species. The shell is well distinguished from *H. orbiculata* by its more depressed form, its carinated suture and the smoothly curved gibbous form of the lip at its base, instead of the decided angle of *H. orbiculata*. The peculiar suture, in every example I have seen, constantly marks the species. A single specimen of a recent shell has come under observation, in which the spire exhibits the above characters; but the aperture is different, and the history of the shell is not known. Most of the land and fluviatile shells inhabiting the valley of the Ohio and Mississippi, have been found fossil in the bluffs of that region, under the same circumstances in which this is found; and should this species prove to be extinct, it will be the only land shell yet found, which has coexisted with the now recent species, and has become extinct. One or two fluviatile species, *Limnea obrussa* and *galbana* for instance, have also become extinct.—[G.]

WOOD-CUTS.

THE originals of the wood-cuts representing the lingual hooks, were unfortunately mislaid by the engraver; so that the respective species to which they belonged could not be identified. Many of them were, therefore, introduced at random. Some of the drawings having been subsequently found, the following have been determined:—

- Page 44, *Helicina orbiculata*.
- " 102, *Helix albolabris*.
- " 131, *Helix thyroidus*.
- " 139, *Tebennophorus Caroliniensis*.
- " 152, *Helix hirsuta*.
- " 179, *Helix profunda*.
- " 185, *Helix tridentata*.
- " 189, *Helix auriculata*.
- " 200, *Helix exoleta*.
- " 209, *Helix pulchella*.
- " 215, *Helix alternata*.
- " 260, *Helix labyrinthica*.
- " 262, *Helix lineata*.
- " 270, *Bulimus fasciatus*.
- " 297, *Glandina truncata*.
- " 303, Ditto, greatly magnified.
- " 344, *Pupa maritima*.

Those on pages 206, 220, 228, 246, 255, 355, have not been identified.

NOTE.—The name *H. dejecta*, (pp. 47, 89,) having been previously appropriated, and also *H. abjecta*, (pp. 122, 135,) which refers to the same shell,—the name *H. divesta* is to be substituted.

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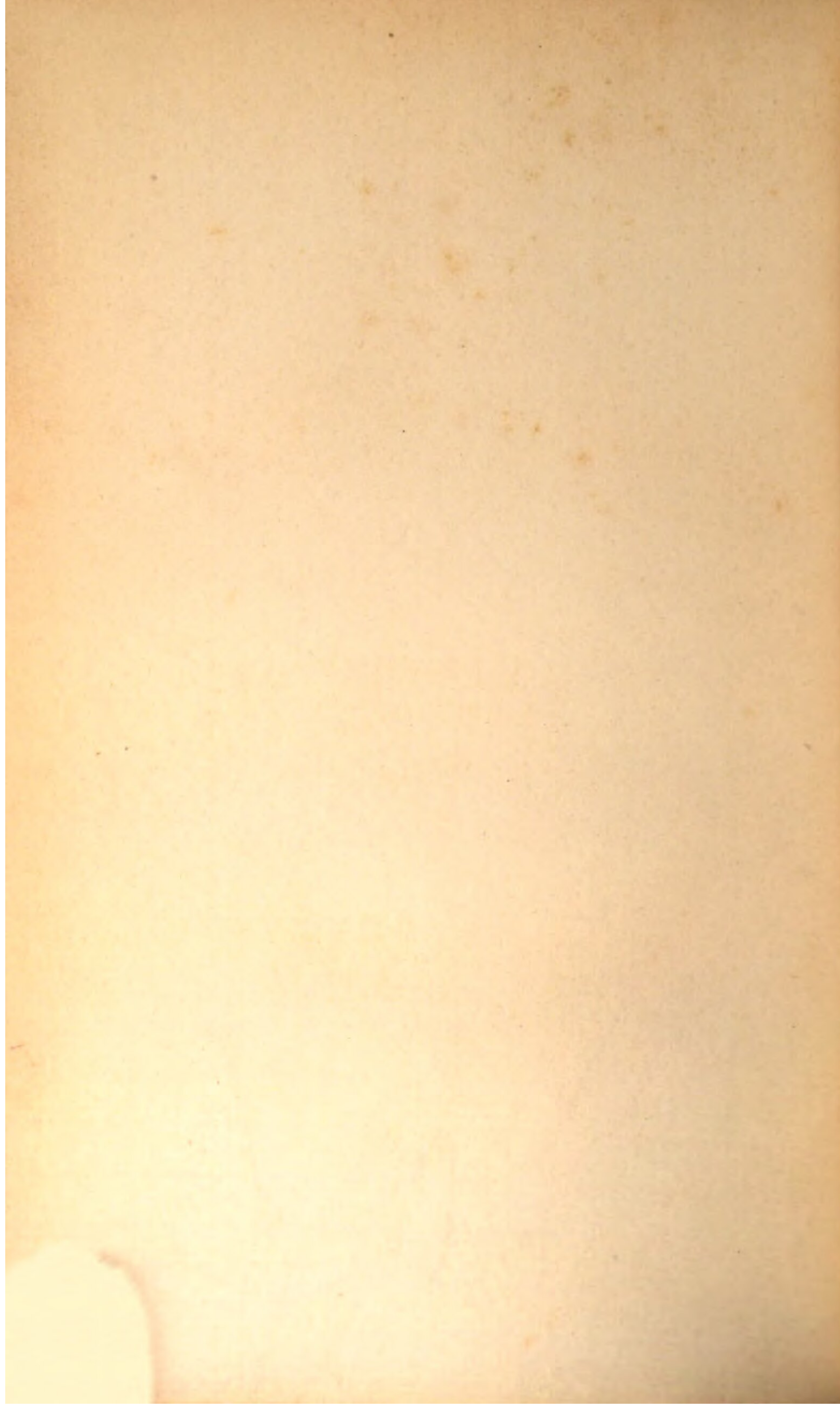
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END OF VOLUME II.

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Binney, Amos

The terrestrial Air-breathing Mollusks of the United States, and the
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